2. REGIONAL DESCRIPTION

Los Cerritos Wetland

More than 90 percent of coastal wetlands have been eliminated in the Region. The Los Cerritos wetlands is one of the remaning few.

2.1 Introduction

The purpose of this section is to discuss why preparation of an IRMWP for this Region is appropriate, describe the physical characteristics of the Region, describe the sources of water and estimate water demand, identify water quality issues, and describe social trends and concerns in the Region.

2.2 Overview

Greater Los Angeles County Region

The Region, an area of approximately 2,058 square miles, is located in coastal southern California (refer to Map 1-1). The Region contains portions of four counties; Los Angeles, Orange, Ventura, and San Bernardino. It is bordered by five other IRWMP Planning Regions: the Watershed Coalitions of Ventura County (which consolidated the Ventura County and Calleguas Creek Watershed efforts) on the west, the Municipal Water District of Orange County and the Santa Ana Watershed Project Authority to the south, and the Upper Santa Clara River and Antelope Valley to the north. The Mojave Water Agency's Regional Water Management Planning Area is located to the northeast of the Region.

Although the development of an IRWMP at this scale was not originally envisioned by local stakeholders, the preparation of an IRWMP for this Region is appropriate, given the consistency of the major water resource management issues, including substantial dependence on imported water, poor surface water quality due to urban and stormwater runoff, opportunities to expand water conservation and the produc-

tion and utilization of recycled water, and significant groundwater resources in much of the area. Water resource management planning at this scale provides an opportunity to optimize use of stormwater, recycled water, and groundwater resources to reduce dependence on imported water and concurrently enhance water supply reliability.

Subregional Characteristics

Lower San Gabriel and Los Angeles Rivers Watersheds

The Lower San Gabriel and Los Angeles Rivers Watershed Subregion is comprised of 37 cities, 27 in the Gateway Cities COG area and 10 in the Orange County portion of the Coyote Creek watershed and dozens of water agencies/companies and other entities which have an interest in a variety of water management issues. This Subregion faces significant ground and surface water quality challenges, as well as flood control issues, due to its location in the lower reaches of two major watersheds and intense urban development changes. It has the greatest water recharge capacity in the Greater Los Angeles County Region due to the recharge basins at Whittier Narrows. Further, it has the most densely developed commercial and industrial land uses coupled with the least amount of open space on a per acre basis in the Greater Los Angeles County Region; notably several cities in the Subregion are over 100 years old. Further, this Subregion is in the lower reaches of a vast metropolitan area and, therefore has significant water quality issues along with tremendous opportunities for conjunctive use, recycled and reclaimed water use, desalination and wetlands restoration in the estuaries of the San Gabriel and Los Angeles Rivers. One of the greatest challenges in the Subregion is identifying opportunities for multipurpose projects in a heavily built out landscape. The cities in the Subregion face many competing needs, including replacing aging infrastructure, providing affordable housing and increasing public safety. A considerable number of the cities have experienced and will continue to experience severe funding shortages for infrastructure repair, maintenance and installation along with high household poverty rates.

North Santa Monica Bay Watersheds

The North Santa Monica Bay watersheds differ substantially from the other Subregions with respect to land use, water supply, groundwater and surface water qualiy, aquatic resources, open space

Steep mountain slopes and adjacent flatlands create both challenges and opportunities for water resource management .

and recreation. Over 85 percent of the Subregion is still undeveloped open space; remaining land uses in the area are primarily residential and concentrated along the coastline and interior valleys. There is little heavy industry. The Subregion depends almost entirely on imported water due to naturally-poor groundwater quality and limited surface storage opportunities. Per capita recycled water use is among the highest in the nation, but further expansion is limited to areas that are difficult to reach due to cost. Aquatic habitat protection and restoration is a special priority, as the Subregion includes the Santa Monica Mountains National Recreation Area, several State Parks, a state designated Area of Biological Significance (ASBS), and Malibu Lagoon, all heavily used for recreation. The Subregion is also home to over a dozen endangered and threatened species, including the southernmost Steelhead Trout population in the state.

South Bay Watersheds

The South Bay watersheds consist of three defining characteristics—its coastline, its population and its industry. More than 30 miles of coastline in the South Bay attract tens of millions of visitors to Southern California every year, serve as an important recreation area for the area's residents both rich and poor, and in a few remaining pockets such as the Palos Verdes Peninsula, Madrona Marsh, Ballona Wetlands, portions of the Santa Monica Mountains and Baldwin Hills, support a diverse population of birds and other wildlife. With over 2.9 million residents, the South Bay is one of the most dense and economically diverse urban areas of the region, creating both challenges to preserve and enhance local water resources and the natural environment as well as unique opportunities for collaboration. The South Bay's industries--oil refining, power generation, and transportation via the Port of Los Angeles, Los Angeles International Airport and major freeways—provide similar challenges and opportunities.

Upper Los Angeles River Watershed

The Upper Los Angeles River Watersheds is home to approximately 2.3 million residents, mostly in development concentrated in the interior valleys and the foothills, which are generally surrounded by large expanses of open space in the San Gabriel, Verdugo, Santa Monica, and Santa Susanna Mountains. In most years, the mountains generate substantial runoff, much of which can be recharged into the underlying groundwater basins

The Los Angeles River is fed by the largest drainage area in the Region.

via favorable soils along the major channels and on the valley floors. The large expanses of urban and suburban development on the valley floors, and significant residential development in canyons and associated hillsides, have resulted in the channelization of most of the major river and stream channels and contributed to degraded surface water quality in those channels. Restoration or enhancement of several major channels, including the Los Angeles River, provides opportunities to improve water quality, enhance water supplies and restore habitat.

Upper San Gabriel River and Rio Hondo Watersheds

The Upper San Gabriel River and Rio Hondo Watersheds contains large expanses of open space in the San Gabriel Mountains (including much of the Angeles National Forest) and the Puente, and San Juan Hills, with development concentrated in the interior valleys and the surrounding foothills. Several groundwater basins, including the vast San Gabriel basin, and runoff from the San Gabriel Mountains provide significant water supplies, although groundwater contamination from industrial sources and prior land uses poses a significant challenge in some locations. The large expanses of urban and suburban development on the valley floors are home to approximately 1.6 million residents. Although most of the major river and stream channels on the valley floors have been subject to channelization, several of these, including the San Gabriel River, have natural bottoms, which promote instream percolation of runoff.

2.3 Physical Setting

Geology and Geomorphology

The geography of the Region can generally be divided into four distinct types: the coastal plain, inland valleys (e.g., San Fernando, San Gabriel, Pomona, and Walnut), foothills that generally surround the valleys, and two mountain ranges (the Santa Monica and San Gabriel Mountains). These mountains are part of the Transverse Ranges, which extend 350 miles east to west from the Eagle Mountains in San Bernardino County to the Pacific Ocean. To the north, the San Gabriel Mountains separate the Los Angeles basin from the Mojave Desert. To the west, the Santa Monica Mountains separate the Los Angeles basin from the Ventura basin. Topography in the Region ranges from sea level to over 10,000 feet in the San Gabriel Mountains. Most of the coastal plain is less than 1,000 feet in elevation. The foothills reach 3,000 to 4,000 feet before rising rapidly into the San Gabriels, to a height of 10,064 feet at Mount San Antonio (or Mount Baldy). The grade of the mountain slopes in the San Gabriels average 65 to 70 percent, some of the steepest slopes in the world.

Geology varies from Precambrian metamorphic rocks (1.7 billion years old) to alluvial deposits washed down from mountain canyons. The San Gabriel Mountains are young mountains, geologically speaking, and continue to rise at a rate of nearly three-quarters of an inch per year. Because of this instability, they are also eroding at a rapid rate. Alluvial deposits of sand, gravel, clay and silt in the coastal plain are thousands of feet thick in some areas, due in part to the erosive nature of the San Gabriel and Santa Monica Mountains.

The Region is extensively faulted, with the San Andreas Fault bordering the north side of the San Gabriels and the Sierra Madre–Cucamonga fault zone on the south side. Throughout the Region are hundreds of lesser fault systems, such as the Newport-Inglewood fault that runs from Newport Beach to Beverly Hills via Long Beach and Signal Hill. The most notorious are those that have been the cause of major earthquakes during the past few decades, known not by name but by the area in which they struck: Sylmar in 1971, Whittier Narrows in 1987, and Northridge in 1994.

Climate

The Region is within the Mediterranean climate zone, which extends from Central California to San Diego and is characterized by winter precipitation followed by dry summers.

The geography of the Los Angeles Region results in a great deal of spatial variation in the local climate. The abrupt rise of the mountains from the coast creates a barrier that traps moist ocean air against the southerly slopes and partially blocks the desert summer heat and winter cold from the

interior northeast. The common perception of the region as desert is misleading. The coastal plain may be more appropriately termed "semi-arid," although portions of the San Gabriel Mountains receive considerable snow and rainfall most years.

Summers are dry, with most precipitation falling in a few major storm events between November and March. Long-term annual rainfall averages vary from 12.2 inches along the coast, 15.5 inches in downtown Los Angeles to 27.5 inches in the mountains. The maximum-recorded 24-hour rainfall in the Region was 34 inches in the mountains and 9 inches on the coastal plain.

2.4 Internal Boundaries

The Region has a variety of internal boundaries that have been defined for different purposes. In many cases, these boundaries overlap. This section describes the different sets of internal boundaries: subregional (described previously), watershed, political and water supply.

Subregional Boundaries

To manage stakeholder input and acknowledge local variation, the Region includes five Subregions (refer to Map 1-2):

- Lower San Gabriel and Los Angeles Rivers Watersheds;
- North Santa Monica Bay Watersheds;
- South Bay Watersheds;
- Upper Los Angeles River Watershed; and
- Upper San Gabriel River and Rio Hondo River Watersheds.

Watershed Boundaries

The Los Angeles and San Gabriel Rivers drain approximately 1,513 square miles of the Region and discharge to San Pedro Bay. These two watersheds are connected via the Rio Hondo, which transfers water during large storm events from the San Gabriel to the Los Angeles River. Other major watersheds in the region include Malibu Creek, Topanga Creek, Ballona Creek, and the Dominguez Channel. Dozens of smaller watersheds drain directly to Santa Monica or San Pedro Bays. Based on the Watershed Management Initiative Chapter of the Basin Plan prepared by the Los Angeles RWQCB, the IRWMP Region includes the Los Angeles River Watershed, the San Gabriel River Watershed, the Santa Monica Bay Watershed Management Area (WMA), and the Dominguez Channel WMA. The Los Angeles RWQCBs WMAs are shown on Map 2-1.

Given the extent of urbanization within the developed coastal plain and interior valleys, rivers, major creeks, and most tributaries have been channelized. In contrast, the creeks and streams within the San Gabriel Mountains and Santa Monica Mountains generally are unchannelized, with minimal improvements at some locations.

Major Water Supply Boundaries

Within the Region, there are 35 major institutions that provide water or wastewater services or manage groundwater resources. The general boundaries of the major water wholesale districts and city-operated water agencies, with the five Greater Los Angeles County IRWMP Subregions overlain, are shown on Map 2-2.

Political Boundaries

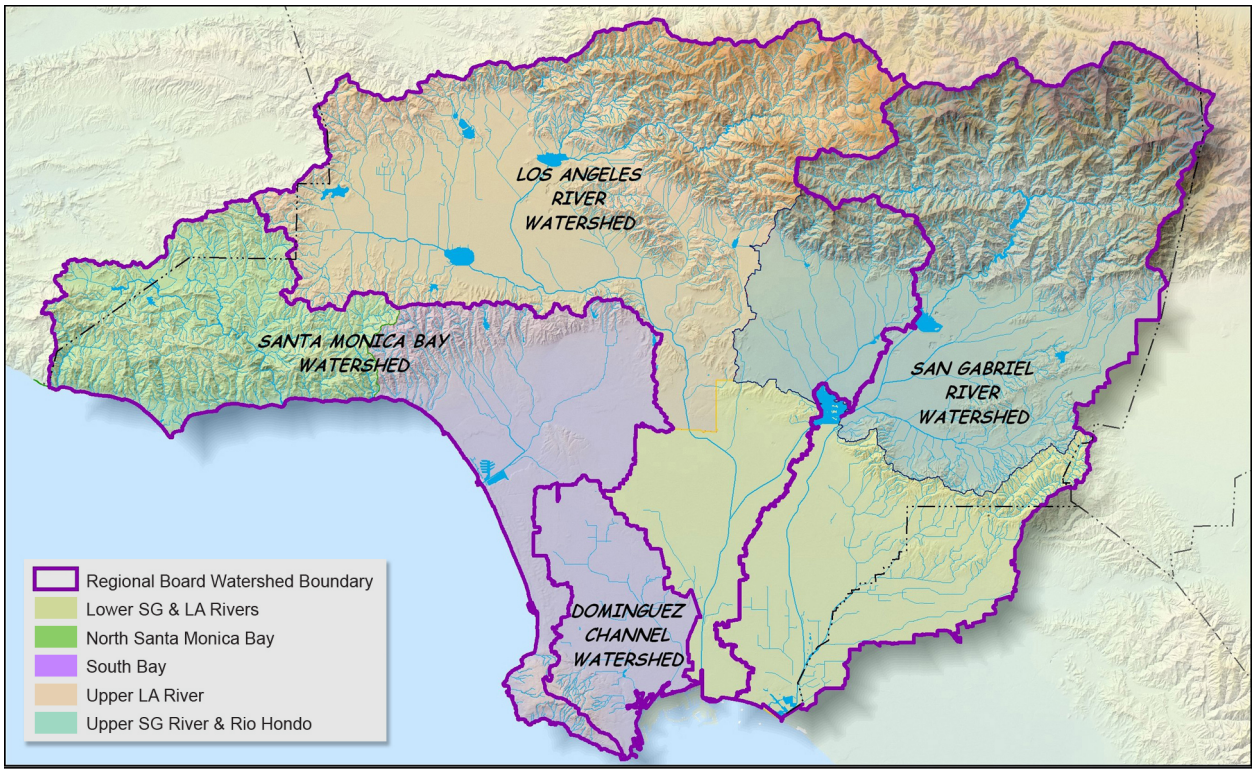
The Region includes portions of 4 counties and 92 cities. Maps 2-3(A) through 2-3(E) depict the county and city boundaries within each of the five Subregions.

2.5 Sources of Water Supply

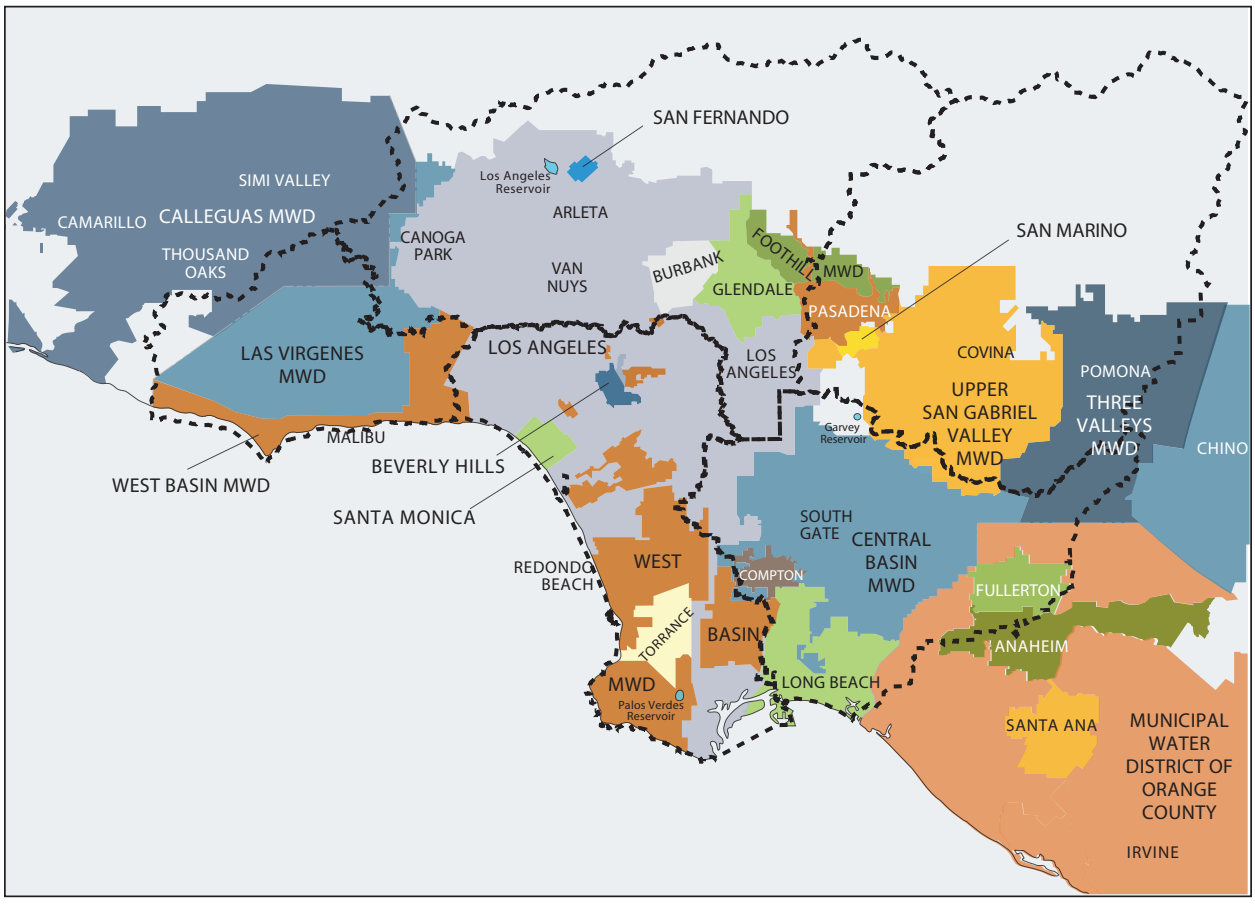
The Region has developed a diverse mix of local and imported water supply sources. Local water resources include groundwater, surface water, recycled water, water conservation, water transfers, and storage. Water is imported through the California State Water Project (SWP), the Colorado River Aqueduct, and the Los Angeles Aqueducts. Major water supply sources are described below.

Groundwater

Groundwater represents a significant portion of local supplies in the Region, approximately 23 percent of the Region's entire supply in an average year, and 29 percent in a dry year. Most groundwater basins in the Region are adjudicated (via a court decision) and producers within these basins



Map 2-1. RWQCB Watershed Areas and IRWMP Subregions.



Map 2-2. Major Water Suppliers in the IRWMP Region.

follow management guidelines established by their respective adjudications. Exceptions are the Orange County Basin, Santa Monica Basin and Hollywood Basin. The City of Santa Monica plans to implement a groundwater management plan for that basin. The Orange County Basin (which extends outside the southern boundary of the Region) is managed by Orange County Water District, which was established in 1933. There are no significant groundwater basins in the North Santa Monica Bay Watersheds.

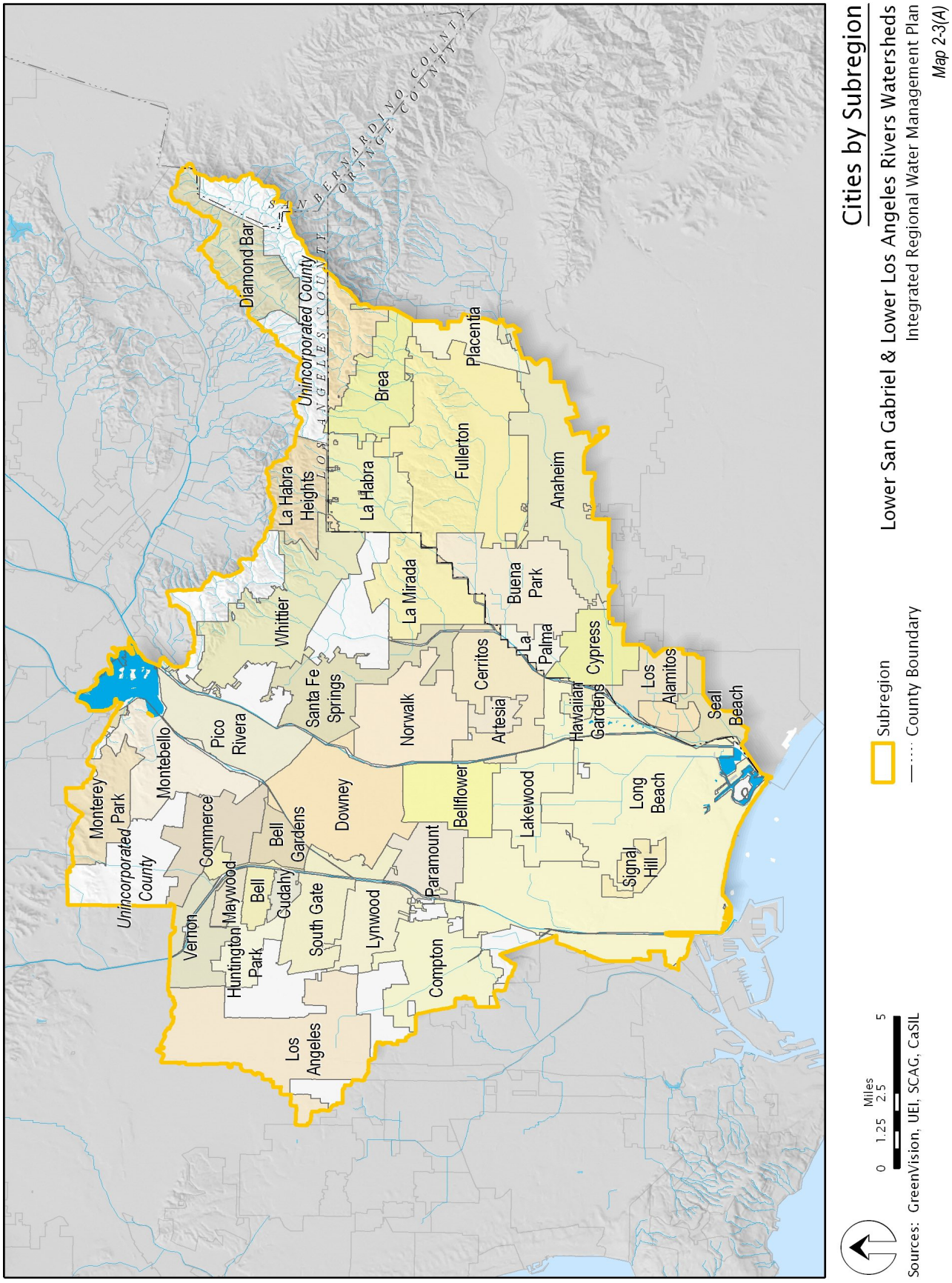
Groundwater basin recharge can occur via exisiting and restored natural channel bottoms or percolation of rainwater (natural recharge), however natural recharge is typically insufficient to maintain basin water levels and current pumping levels due to the extent of impervious surfaces and the presence of clay soils in parts of the Region. Many agencies rely on artificial recharge, by diverting local supplies from rivers or creeks when flow conditions are optimal, to spreading grounds (or basins) which typically contain sandy soils that promote infiltration. In some locations, spreading is limited because of the capacity limitations of the spreading facilities rather than being limited by water supply. Historical concerns about the presence of urban contaminants in stormwater may also limit the amount of local water that can be recharged, although the Water Augmentation Study being conducted by the Los Angeles and San Gabriel Rivers Watershed Council is monitoring several sites to determine whether stormwater pollutants migrate to groundwater. In addition, recycled water is infiltrated in spreading grounds and injected (along with imported water) along the coast to form barriers to seawater intrusion at three locations (the Alamitos, Dominguez Gap, and West Coast Basin Barriers). This water augments and blends with groundwater, which is eventually extracted for potable use

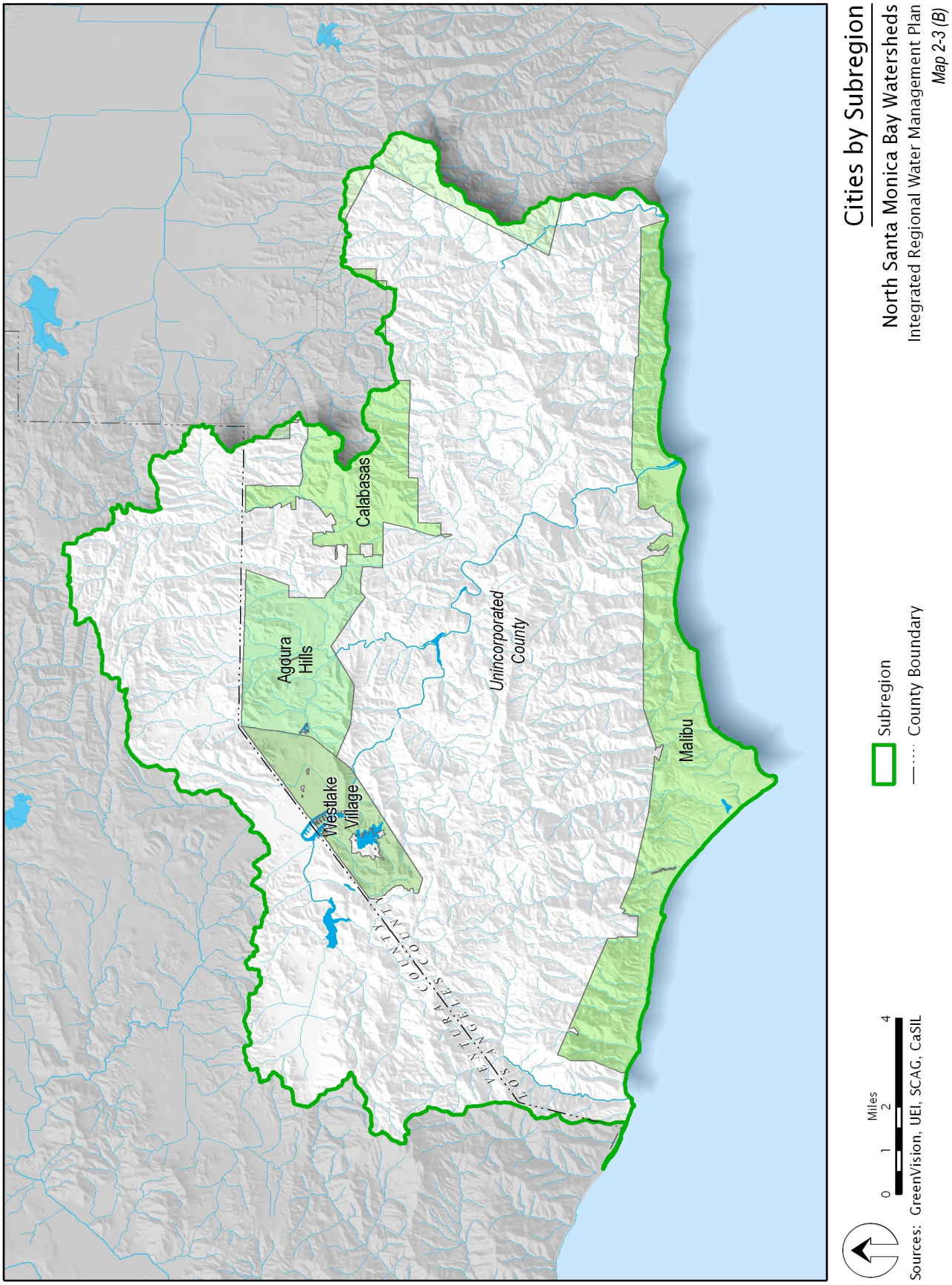
Conjunctive use programs may also be implemented to recharge basins, where imported water is recharged via spreading grounds or injection wells. Recharge can also occur "in-lieu," when an agency suspends production from its wells and uses other supplies. The reduction in pumping permits groundwater levels in the basin to recover. The amount of water that can be recharged in the basin may be limited by local runoff, recharge capacity, overlying groundwater demands, and water rights.

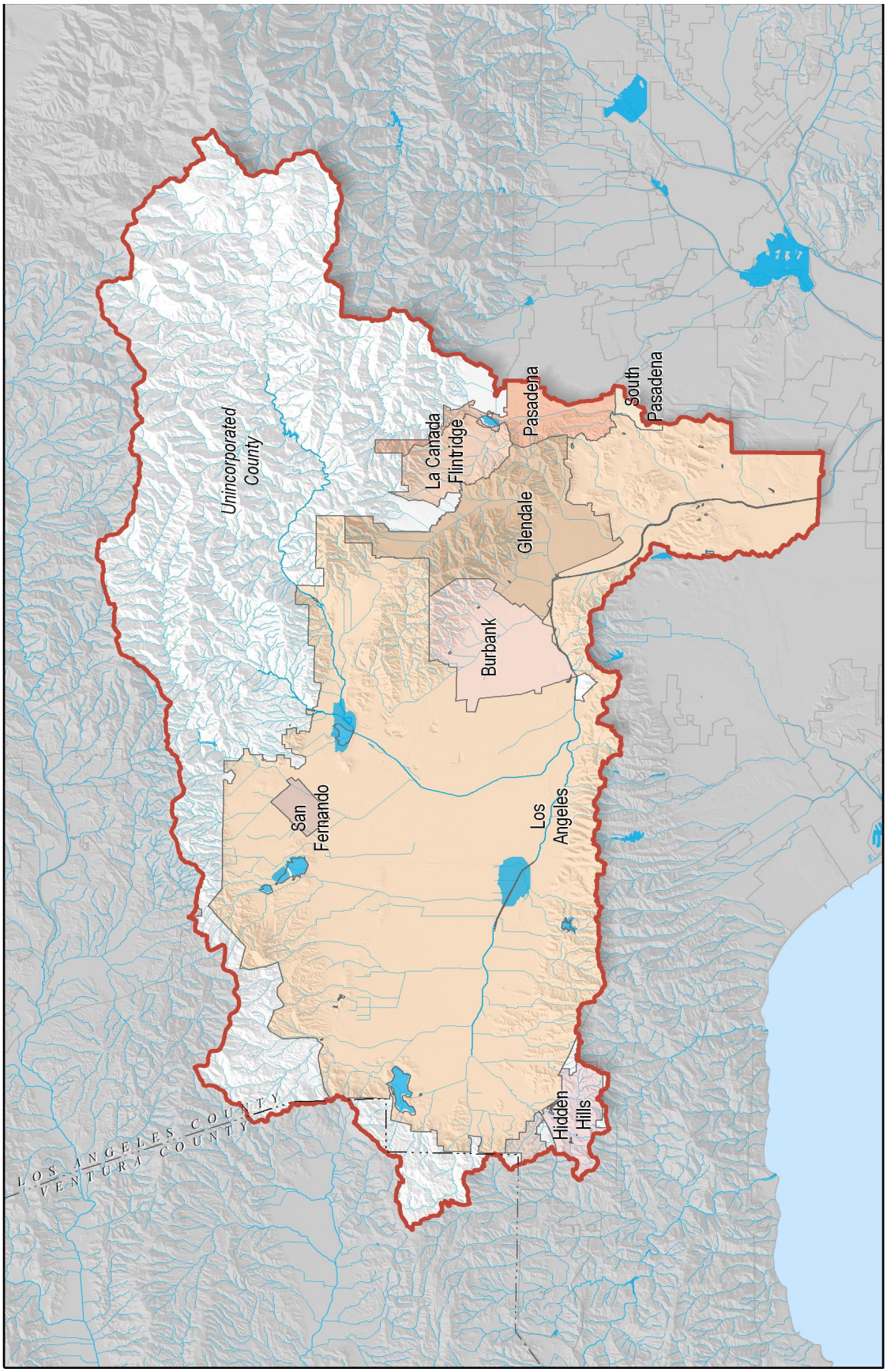
Most of the time, it is more cost effective for agencies to supply groundwater rather than purchase imported water. Thus, the strategy of most groundwater agencies is to maximize groundwater production, up to estimated annual yield limits without significantly impacting groundwater levels, and meet the balance of the customer demand through imported or local water.

Groundwater basin water quality is a significant issue in the Region, as natural conditions result in high dissolved salt levels. In some aquifers, salt levels are so high the water is termed "brackish," which either requires desalination or advanced treatment to make the supply usable or blending the treated water with other supplies that have a lower salt content. In addition, land use practices and production practices have deteriorated water quality in portions of certain groundwater basins. Many factors have contributed to the deterioration of water quality including historic overdrafting of groundwater basins (sometimes resulting in seawater intrusion), industrial discharges, agricultural chemical usage, livestock operations, contaminants in urban runoff, and naturally occurring constituents. The cost of treating these contami-

Possible future drought year reductions in water supply from the Colorado River highlight the need for less dependence on imported water in the Region.

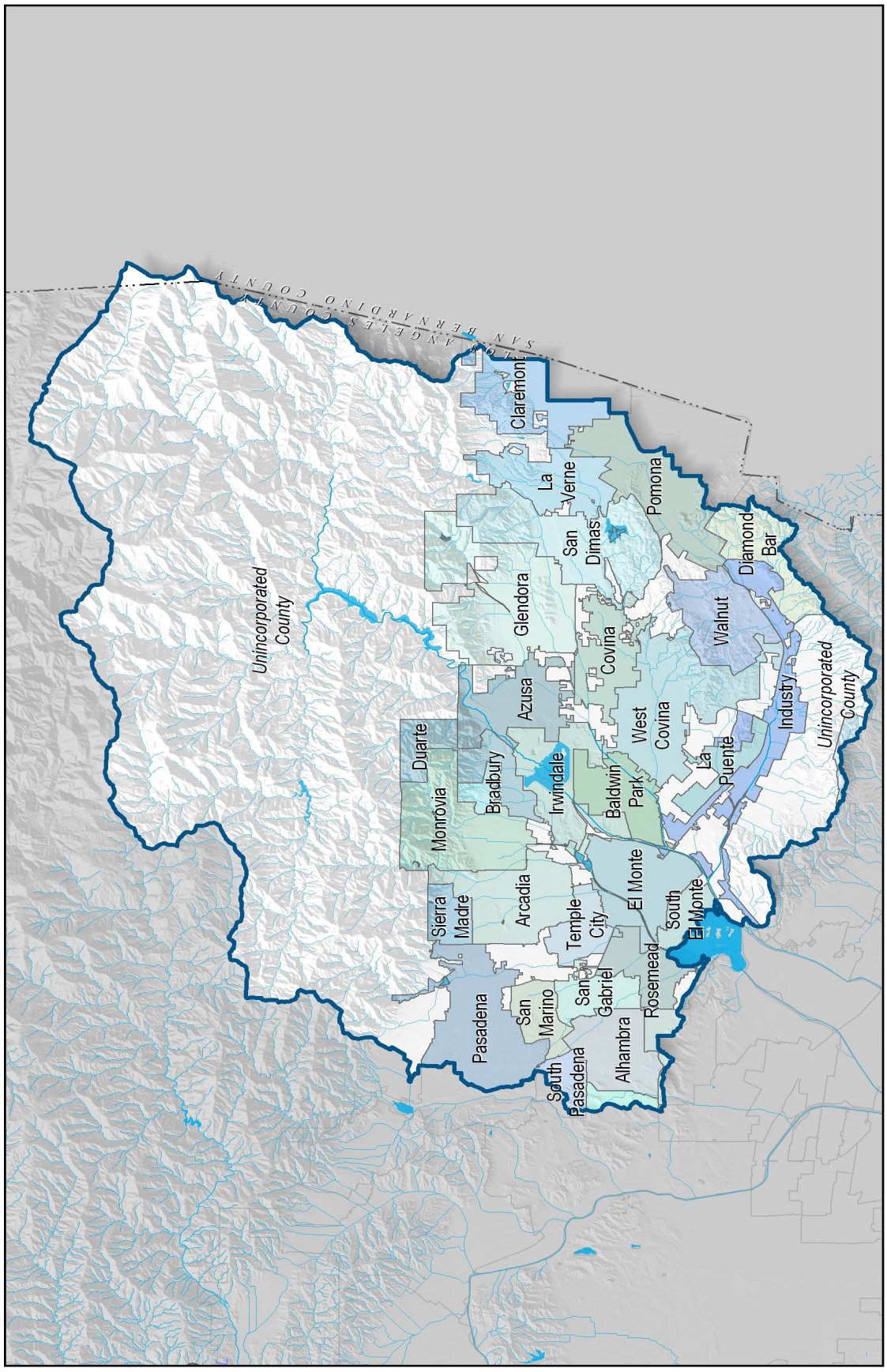

Cities by Subregion
Lower San Gabriel & Lower Los Angeles Rivers Watersheds
Integrated Regional Water Management Plan
Map 2-3(A)
Subregion
County Boundary
0 1.25 2.5 5
Miles
Sources: GreenVision, UEI, SCAG, CaSIL
SAN BERNARDINO COUNTY
ORANGE COUNTY
LOS ANGELES COUNTY
Diamond Bar
Unincorporated County
La Habra Heights
Whittier
La Habra
Brea
Placentia
Fullerton
Anaheim
La Mirada
Buena Park
La Palma
Cypress
Cerritos
Artesia
Hawaiian Gardens
Los Alamitos
Seal Beach
Santa Fe Springs
Norwalk
Pico Rivera
Montebello
Monterey Park
Unincorporated County
Commerce
Bell Gardens
Downey
Bellflower
Lakewood
Long Beach
Signal Hill
Paramount
Bell
Cudahy
Maywood
South Gate
Lynwood
Compton
Vernon
Huntington Park
Los Angeles

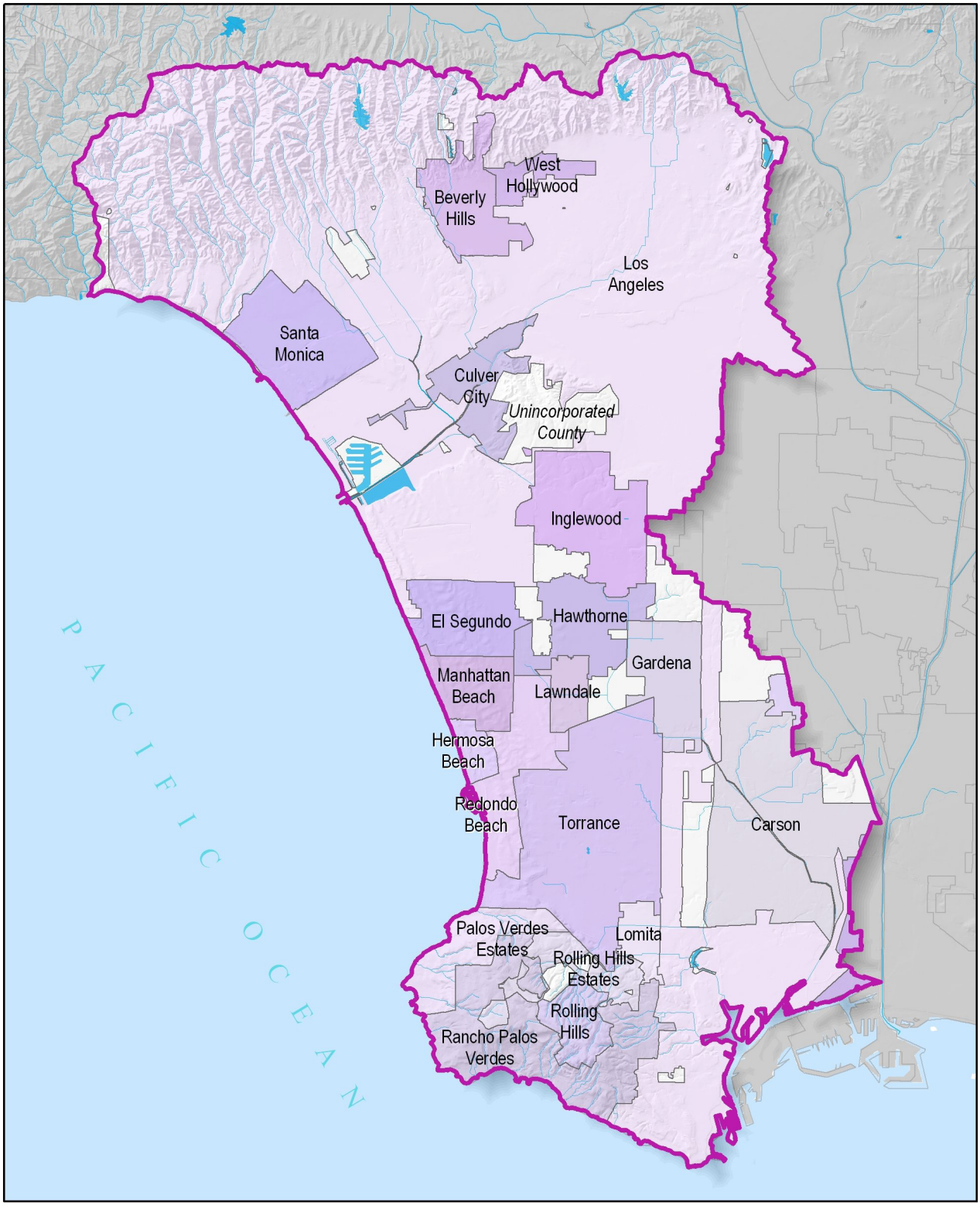

Cities by Subregion
North Santa Monica Bay Watersheds
Integrated Regional Water Management Plan
Map 2-3 (B)
Calabasas
Agoura Hills
Westlake Village
Malibu
Unincorporated County
Subregion
County Boundary
0
1
2
4
Miles
Sources: GreenVision, UEI, SCAG, CaSIL



Cities by Subregion

Upper Los Angeles River Watersheds
Integrated Regional Water Management Plan
Map 2-3 (C)


Cities by Subregion
Upper San Gabriel River & Rio Hondo Watersheds
Integrated Regional Water Management Plan
Map 2-3(D)
Subregion
County Boundary
Miles
0 1.5 3 6
Sources: GreenVision, UEI, SCAG, CaSIL
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
Unincorporated County
Claremont
La Verne
Pomona
San Dimas
Diamond Bar
Glendora
Walnut
Covina
Azusa
Industry
Unincorporated County
Duarte
Monrovia
Bradbury
Irwindale
Baldwin Park
West Covina
La Puente
Sierra Madre
Arcadia
Temple City
El Monte
South El Monte
Pasadena
San Marino
San Gabriel
Rosemead
Alhambra
South Pasadena



Miles
0 1.25 2.5 5

Sources: GreenVision, UEI, SCAG, CaSIL

Subregion

Cities by Subregion

South Bay Watersheds
Integrated Regional Water Management Plan
Map 2-3 (E)

nants is often significant, and for some improperly disposed chemicals, effective treatment has not yet been identified. Various agencies, including the San Gabriel Basin Water Quality Authority and the Water Replenishment District have implemented programs to assess treatment options and treat the contaminated groundwater.

Local Surface Water

Los Angeles River

The Los Angeles River flows 51 miles from the union of Bell Creek and Arroyo Calabasas in the San Fernando Valley, then southeast through the City of Burbank and eventually southward to Long Beach. Originally, the Los Angeles River was the primary water source for the City of Los Angeles. Following several catastrophic floods, the U.S. Army Corps of Engineers encased most of the river bed and banks in concrete, effectively eliminating interaction between groundwater and surface water, except for those portions where the natural bottom was retained due to high groundwater levels that made concrete lining infeasible. Today, the river is primarily fed from stormwater, effluent from wastewater treatment plants, urban runoff, base flow from the Santa Monica and San Gabriel Mountains, and groundwater inflow in the Glendale Narrows. Runoff from several tributaries is diverted to spreading grounds and facilities at various locations in the San Fernando Valley.

San Gabriel River

The San Gabriel River flows 75 miles southwest from the San Gabriel Mountains, then southward from the Whittier Narrows to its ocean discharge at the City of Seal Beach. Unlike the Los Angeles River, due to more favorable soil conditions the San Gabriel River has a natural bed for most of its length, although the banks are armored with rip rap and concrete for flood control purposes. The river is fed by stormwater, base flow from the San Gabriel Mountains, dry weather urban runoff and effluent from wastewater treatment plants. Municipalities in the upper portion of the watershed receive portions of their water supply from surface water runoff from the San Gabriel Mountains. Significant quantities of surface water naturally recharge groundwater via the permeable bottom in the San Gabriel River and are also used for groundwater recharge in several locations. During the dry season, the presence of dams and other diversions results in river flow that is sometimes discontinuous, as some river reaches are dry, while other reaches have flow.

Imported Water

State Water Project

The California SWP is a system of reservoirs, pumps and aqueducts that carries water from Lake Oroville and other facilities north of Sacramento to the Sacramento-San Joaquin Delta and then transports that water to central and southern California. Although the system was never fully completed and typically delivers less than designed, when water is available the SWP is able to deliver its contractual amount of slightly more than four million acre-feet/year. Environmental concerns in the Sacramento-San Joaquin Delta have limited the volume of water that can be pumped from the SWP. The potential impact of further declines in ecological indicators in the Bay-Delta system on SWP water deliveries is unclear. Uncertainty about the long-term stability of the levee system surrounding the Delta system raises concerns about the ability to transfer water via the Bay-Delta to the SWP.

The Metropolitan Water District's contract with DWR, operator of the SWP, is for 2,011,000 acre-feet/year– about half the total project. However, Metropolitan projects a minimum dry year supply from the SWP of 650,000 acre-feet/year, and average annual deliveries of 1.5 million acre-feet/year. These amounts do not include water which may become available from transfer and storage programs. The San Gabriel Valley MWD's contract with DWR is for 28,800 acre-feet/year. However, currently San Gabriel Valley MWD only uses this water to replenish the Main San Gabriel Basin as needed by its member agencies and the Main San Gabriel Basin Watermaster and is generally able to balance demands during dry years with water stored in the groundwater basin.

Metropolitan began receiving water from the SWP in 1972. The infrastructure built for the project has become an important water management tool

for moving not only annual entitlement from the SWP but also transfer water from other entities. Metropolitan, among others, has agreements in place to store water at a number of points along the aqueduct, primarily in Kern County. When needed, the project facilities can be used to move water hundreds of miles to southern California. However, there are certain obstacles that must be overcome, including substantive limitations on the movement of water across the Bay-Delta system, constraints related to the quality of water, and the cost of the water. Generally speaking, DWR will not allow water in their aqueduct that is of lower quality than its own water.

Colorado River

California water agencies are entitled to 4.4 million acre-feet/year of Colorado River water. Of this amount, the first three priorities totaling 3.85 million acre-feet/year are assigned in aggregate to the agricultural agencies along the river. Metropolitan's fourth priority entitlement is 550,000 acre-feet/year. Until a few years ago Metropolitan routinely had access to 1.2 million acre-feet/year because Arizona and Nevada had not been using their full entitlement and the Colorado River flow was often adequate enough to yield surplus water to Metropolitan. Metropolitan delivers the available water via the 242-mile Colorado River Aqueduct, completed in 1941, which has a capacity of 1.2 million acre-feet/year.

While the Quantification Settlement Agreement (QSA) affirms the state's right to 4.4 million acre-feet/year, water allotments to California from the Colorado River could be reduced during future droughts along the Colorado River watershed as other states increase their diversions in accord with their authorized entitlements. California's Colorado River Water Use Plan and the QSA identify measures to conserve water (such as the lining of existing earthen canals) and to shift some water from agricultural use to urban use. Such transfers between willing sellers and willing buyers would offset potential reductions in future deliveries of urban water made available by the Colorado River. The QSA and several other related agreements were executed in October 2003. The QSA and related agreements provides the numeric baseline to measure conservation and transfer programs by which unused agricultural priority water would be made available for diversion by Metropolitan. It also allows for implementation of agricultural conservation, land management, canal lining and other programs. By 2020, the QSA programs are expected to allow delivery to full capacity of the Colorado River Aqueduct at 1.25 million acre-feet if needed.

Los Angeles Aqueducts

High-quality water from the Mono Basin and Owens Valley is delivered through the Los Angeles Aqueducts to the City of Los Angeles. Construction of the original 233-mile Los Angeles Aqueduct from the Owens Valley was completed in 1913. In 1940 the aqueduct was extended 105 miles north to Mono Basin. A second aqueduct from Owens Valley was completed in 1970 to further increase capacity. Approximately 480,000 acre-feet/year of water can be delivered to the City of Los Angeles each year; however the amount the aqueducts deliver varies from year to year due to fluctuating precipitation in the Sierra Nevada Mountains and mandatory in-stream flow requirements. In addition, the diversion of water from Mono Lake has been reduced following a decision of the SWRCB and exportation of water from the Owens Valley is limited by the Inyo-Los Angeles Long Term Water Agreement (and related MOU) and an additional MOU between the Great Basin Air Pollution Control District and the City of Los Angeles (to reduce particulate matter air pollution from the Owens Lake bed). As a result of these restrictions on water transfers, future deliveries are expected to be reduced to an average of 321,000 acre-feet/year over the next 20 years.

Recycled Water

Current average annual recycled water production in the Region is approximately 225 mgd, which represents approximately 25 percent of the current average annual effluent flows. Of the 225 mgd of recycled water produced, approximately 107 mgd is currently reused for municipal uses (e.g., irrigation), industrial applications, environmental uses, groundwater replenishment, or maintenance of seawater barriers in groundwater basins along the coast. The

remainder is currently discharged to creeks and rivers, supporting riparian habitat in some locations, or directly to the ocean.

Water Transfers

Prior to 1991, water transfers within the Region had been limited to transfers of annual groundwater basin rights (which continue to occur). In addition, agencies sometimes transferred water to enhance operational flexibility. Metropolitan's facilities generally have not been used to transfer local water from one agency to another mainly because of water quality issues and potential downstream impacts. Sometimes, there is a restriction to export groundwater outside basin boundaries as a result of adjudication of the basin.

In response to the 1991 drought, the Governor's Water Bank was developed. Metropolitan Water District and other SWP contractors took advantage of the program to augment supplies and lessen the severity of drought impacts. Since that time, Metropolitan has participated in water transfers as a water management strategy to augment supplies. The City of Los Angeles plans to develop water transfers as part of its supply strategy. Should the costs of purchasing and wheeling (or moving) water from outside the Region be lower than purchasing Metropolitan water, other agencies would likely be interested in implementing water transfers as a supply strategy.

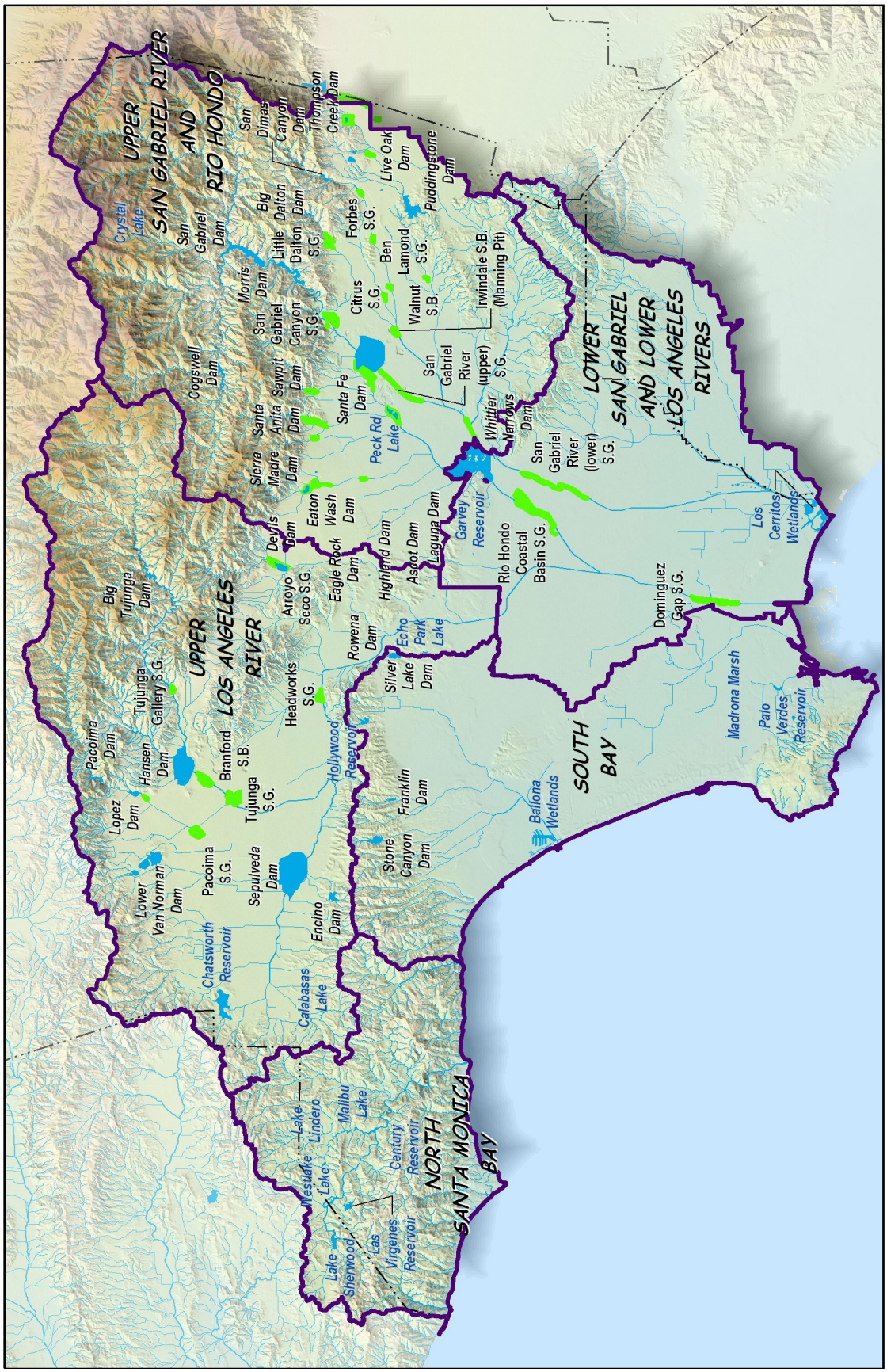
Storage

The water supply in the Region is heavily dependent on imported surface water; therefore various surface reservoirs (managed by Metropolitan Water District and the SWP) located outside the Region (such as Diamond Valley Lake) are used to facilitate water delivery to local water agencies and districts. Several smaller reservoirs have also been developed within the Region to assist in the management of water supplies. However, most of these local reservoirs are limited in their ability to capture local runoff. Most of the remaining dams in the Region have been developed for flood management purposes and are typically not used for long-term (e.g., multi-year) surface water storage.

LACDPW oversees several surface water storage facilities, which were created to improve flood protection and store runoff for subsequent release and diversion to 27 groundwater spreading grounds for recharge. Eleven dams were constructed as part of the San Gabriel River and Montebello Forebay water conservation system to impound runoff from the San Gabriel Mountains prior to release for downstream spreading and groundwater recharge. Runoff in the San Gabriel River is captured by three dams in San Gabriel Canyon: Cogswell Dam on the West Fork, San Gabriel Dam below the confluence of the East and West Forks of the San Gabriel River, and Morris Dam, a few miles downstream of San Gabriel Dam. Once released from the upper canyon facilities, runoff flows to Santa Fe Dam and may be diverted to the Santa Fe spreading grounds, located off-river along the northern boundary of the dam, or conveyed downstream to the Rio Hondo and San Gabriel Coastal Basin Spreading Grounds. On tributaries to the Los Angeles River, the Big Tujunga and Pacoima dams provide similar functions. LACDPW also oversees 17 inflatable rubber dams throughout the Los Angeles Basin. Most are used to divert flows into the spreading grounds, although several rubber dams in the San Gabriel watershed also promote short-term groundwater recharge through the stream bottom. Dams, spreading grounds and surface storage in the Region are depicted in Map 2-4.

Las Virgenes MWD purchases treated water from Metropolitan and stores it in Las Virgenes Reservoir, in the City of Westlake Village. The reservoir also provides seasonal water storage allowing Las Virgenes MWD to purchase supplies off-season and deliver at times of peak demand to meet high summer irrigation needs.

The in-city water distribution systems of the City of Los Angeles once included 15 open-air reservoirs. Due to concerns from DHS about open water storage, nine of these reservoirs have been bypassed, replaced, or covered. Los Angeles Reservoir is one of the last remaining open reservoirs. It has a capacity of 10,000 acre-feet and is a primary water source of the San Fernando Valley area. LADWP does not consider removal of the


UPPER SAN GABRIEL RIVER AND RIO HONDO
UPPER LOS ANGELES RIVER
LOWER SAN GABRIEL AND LOWER LOS ANGELES RIVERS
SOUTH BAY
NORTH SANTA MONICA BAY
Crystal Lake
San Gabriel Dam
Cogswell Dam
Morris Dam
San Dimas Canyon Dam
Thompson Creek Dam
Big Dalton Dam
Little Dalton Dam
Live Oak Dam
Puddingstone Dam
Forbes S.G.
Ben Lamond S.G.
Walnut S.B.
Irwindale S.B. (Manning Pit)
Citrus S.G.
San Gabriel Canyon S.G.
San Gabriel River (upper) S.G.
Santa Fe Dam
Peck Rd Lake
Whittier Narrows Dam
San Gabriel River (lower) S.G.
Sierra Madre Dam
Santa Anita Dam
Sawpit Dam
Devils Gate Dam
Eaton Wash Dam
Arroyo Seco S.G.
Eagle Rock Dam
Highland Dam
Rowena Dam
Silver Lake Dam
Echo Park Lake
Hollywood Reservoir
Headworks S.G.
Big Tujunga Dam
Tujunga Gallery S.G.
Hansen Dam
Pacoima Dam
Lopez Dam
Lower Van Norman Dam
Pacoima S.G.
Sepulveda Dam
Branford S.B.
Tujunga S.G.
Chatsworth Reservoir
Encino Dam
Calabasas Lake
Lake Lindero
Malibu Lake
Century Reservoir
Lake Westlake
Lake Sherwood
Las Virgenes Reservoir
Stone Canyon Dam
Franklin Dam
Ballona Wetlands
Asbot Dam
Laguna Dam
Garvey Reservoir
Rio Hondo Coastal Basin S.G.
Dominguez Gap S.G.
Madrona Marsh
Palo Verdes Reservoir
Los Cerritos Wetlands
Dams, Spreading Grounds and Reservoirs
Greater Los Angeles County Region
Integrated Regional Water Management Plan
Map 2-4
Rivers, creeks, and streams
Reservoirs
Spreading Grounds
Miles
0 2 4 8
Sources: GreenVision, UEI, SCAG, CaSIL

Los Angeles Reservoir a viable option. To protect its water quality, a floating cover was proposed.

The U.S. Army Corps of Engineers oversees Hansen, Lopez and Sepulveda dams in the Los Angeles River Watershed and Santa Fe and Whittier Narrows Dams in the San Gabriel River watershed. They are operated based on various constraints and operational priorities including flood protection, recreation, habitat preservation, and water conservation.

2.6 Water Supply and Demand

As water agency boundaries are not aligned with the Region's boundaries, an estimate of the Region's water supply and demand was not readily available for this Plan. Water supply and demand for the Region was estimated based on review of key documents, the results of a survey distributed to water agencies in the Region, and meetings with Metropolitan Water District and other water agencies staff.

Metropolitan and its member agencies adopted an IRP in 1996 (and updated it in 2004), which establishes targets for Metropolitan and its member agencies to meet demand for a single dry year[1] (assuming a single dry-year supply on the SWP would equal five percent of entitlement based on current conditions). Based on the Metropolitan's IRP, UWMP, and 2005 IRP Report Card, Table 2-1 identifies the IRP supply target categories and year 2025 targets for the entire Metropolitan service area.

In addition to the IRP target categories identified in Table 2-1, it is estimated that an additional 1.9 million acre-feet/year of water would be produced from the Los Angeles Aqueduct and from local groundwater and surface supplies.

As the IRP covers most of the Region, total demand for Metropolitan's IRP can be proportioned to estimate water demand for the Region (supplemented with information on local water production and demand for portions of the Region not serviced by Metropolitan). Estimated water demand for Los Angeles County was combined with 20 percent of the water demand for Orange County (based on the estimated proportion of the total Orange County population residing within the Region), to derive an estimate of total water demand for the Region. By comparing that estimate to the total water demand for the entire Metropolitan service area, the

Table 2-1. Metropolitan Water District's IRP Categories and Targets

IRP Supply Category	2025 Target (acre-feet/year)
Conservation	1,110,000
Local Resources Program (Recycling, Groundwater Recovery, Ocean Desalination)	750,000
Colorado River Aqueduct[1]	1,250,000
State Water Project[2]	650,000
Groundwater Conjunctive Use	300,000
CVP/SWP Storage and Transfer	550,000
Metropolitan Surface Storage[3]	620,000
Total	**5,230,000**

1. *The 1,250,000 acre-feet/year supply from the Colorado River Aqueduct is a target for specific year types when needed. Metropolitan is not expecting a full aqueduct in every year.*
2. *Updated Number from IRP Report card.*
3. *Target for Surface Storage is for total storage capacity, not dry year withdrawal yield.*

[1] *Consistent with recent legislation, water supplies are typically estimated for three climatic conditions (based on historic records), including an average year, a single dry year (meaning a year of below-normal precipitation) and a multi-dry year period (e.g., a period of prolonged drought). For the purposes of this Plan, the demand and supplies are estimated for the single dry-year condition.*

proportion of total Metropolitan demand attributable to the Region (approximately 47 percent) was calculated, as shown in Table 2-2.

By combining information from Metropolitan's IRP, UWMP, the 2005 IRP Report Card, and a survey of local water agencies (conducted for the IRWMP), the Region's current water supplies (for a single dry year) was estimated at 2.55 million acre-feet/year (assuming SWP deliveries in a single dry year would be 5 percent of entitlement). By comparing the Region's supply to the estimated demand (proportioned from Metropolitan's IRP targets), the difference could be determined, as shown in Table 2-3. For the 20-year planning horizon of this Plan, the gap between estimated water demand and water supply is approximately 800,000 acre-feet/year.

Metropolitan's IRP proposes that its member agencies develop projects to increase local water production and conservation, and further suggests that financial incentives can facilitate some of those projects. The IRP also assumes that additional imported water will be available to augment current supplies, including additional deliveries from the SWP and during dry years, additional deliveries from the Colorado River through various programs that Metropolitan is undertaking or investigating.

It should be noted this analysis includes a supply buffer to insure against risk of loss of supply and assumes additional imported water would be available to contribute to the estimated supply gap. This estimate may be subject to revision based on future delivery projections and supply development.

2.7 Water Quality

More than two centuries of agricultural, industrial, and residential development and the widespread use of chemicals, fertilizers, industrial solvents, and household products, has resulted in water quality degradation of varying degrees in both surface water and groundwater in the Region. These sources of degradation can be classified as either point or nonpoint sources. Point sources are the discharge of water and/or wastes to the soil, groundwater, or surface waters. Common examples include wastewater treatment and indus-

Table 2-2. Proportion of Region's Water Demand to MWD Total Demand

	2005	2010	2015	2020	2025
Estimated Total Raw Water Demand for Greater Los Angeles County Region (acre-feet/year)	2,311,906	2,490,680	2,567,861	2,665,909	2,756,739
Total Raw Water Demand for Metropolitan Water District's Service Area (acre-feet/year)	4,851,600	5,237,500	5,437,200	5,670,400	5,891,400
Region's Proportional Demand	48%	48%	47%	47%	47%

Table 2-3. Estimated Regional Water Supply Gap

Year	Estimated Regional Supply[1] (Acre-Feet)	Estimated Regional Demand (Acre-Feet)	Difference (Acre-Feet)
2010	2,550,000	2,700,000	150,000
2015	2,550,000	2,980,000	430,000
2020	2,550,000	3,310,000	760,000
2025	2,550,000	3,350,000	800,000

All numbers rounded.

1. Based on current supply, assuming SWP delivery in a single dry-year would be 5 percent of entitlement.

Figure 2-1. Water Quality Issues. Volunteers on creek clean up duty. Dry weather and stormwater runoff creates significant water quality problems in the Region.

trial discharges and leaking underground storage tanks. Nonpoint sources are area-wide discharges to soil, groundwater, and surface waters, such as the application of fertilizers, atmospheric deposition of contaminants, and litter such as trash and plant materials. Point sources can be traced back to a single source, such as the end of a pipe, while nonpoint sources have widespread origins. Although many stormwater contaminants come from nonpoint sources, as the discharge of stormwater typically occurs via an individual storm drain or channel, stormwater discharge is typically regulated as a point source.

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. Amended in 1977, this law, commonly known as the Clean Water Act, established the basic structure for regulating discharges of pollutants into the waters of the United States and gave the USEPA the authority to implement pollution control programs. In California, per the Porter Cologne Water Quality Control Act of 1969, responsibility for protecting water quality rests with the SWRCB and the RWQCBs.

The SWRCB sets statewide policies and develops regulations for the implementation of water quality control programs mandated by state and federal statutes and regulations. The RWQCBs develop and implement Basin Plans designed to preserve and enhance water quality. The determination of whether water quality is impaired is based on the designated beneficial uses of individual water bodies, which are established in the Basin Plan. As mandated by Section 303(d) of the Federal Clean Water Act, the SWRCB maintains and updates a list of "impaired" water bodies that exceed State and federal water quality standards. To address these impairments, the RWQCBs identify the maximum amount of pollutants, or TMDLs, that may be present without impairing the designated beneficial uses. In addition to development of the TMDLs the RWQCBs develops and implements the NPDES premits for discharges from wastewater treatment and water reclamation plants (shown in Map 2-5) of treated wastewater effluent in the Region to surface water bodies.

Even though agencies and cities in the Region have significantly reduced pollutants that are discharged to water bodies from individual point sources since the Clean Water Act was established, many of the major rivers and water bodies are still considered impaired due to trash, bacteria, nutrients, metals, and/or toxic pollutants. The quality of many water bodies continues to be degraded from pollutants discharged from diffuse and diverse nonpoint sources, and from the cumulative impacts of multiple point sources. As a result, many of the Region's creeks, rivers, and water bodies are included on the most recent update of the 303(d) list of impaired water bodies, as depicted on Maps

2-6(A) and (B). Consequently, during the next ten years, dozens of TMDLs are scheduled to be developed, in addition to the ten TMDLs developed as of early 2006, which will require the implementation of projects and programs by hundreds of point source dischargers, the counties, and the cities in the Region.

Residential use of potable water, the importation of water, and the use of recycled water all have the potential to increase the level of total dissolved solids (TDS) in surface water, wastewater, and groundwater. With naturally-occurring elevated levels of TDS already present in both local surface water and groundwater, the need to manage salt levels has been recognized for some time. The transfer of water within the Region and the recharge of imported water have both been limited due to concerns about potential water quality impacts which include high salinity levels. Higher TDS source water also poses a problem for water recycling facilities because conventional treatment processes are designed to remove suspended, but not dissolved, particles and thus more advanced treatment methods may be required. Several water and wastewater agencies in the Region are members of the Southern California Salinity Coalition, which in conjunction with the National Water Research Institute, seeks to coordinate efforts to address the critical need to remove salt from water supplies and preserve water resources.

Surface Water Quality

Within the Region, surface water quality is generally better in the headwaters and upper portions of watersheds, and is generally degraded by urban and stormwater runoff closer to the Pacific Ocean. Common contaminants in urban and stormwater runoff in the Region are described below.

Sediment is a common component of stormwater, and can be a pollutant at certain levels. Sediment can be detrimental to aquatic life by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can also transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Erosion and subsequent sedimentation is a natural process of the highly-erodable San Gabriel Mountains. Other sources of sediment include stream banks, bridge pilings, vacant lots, and construction sites.

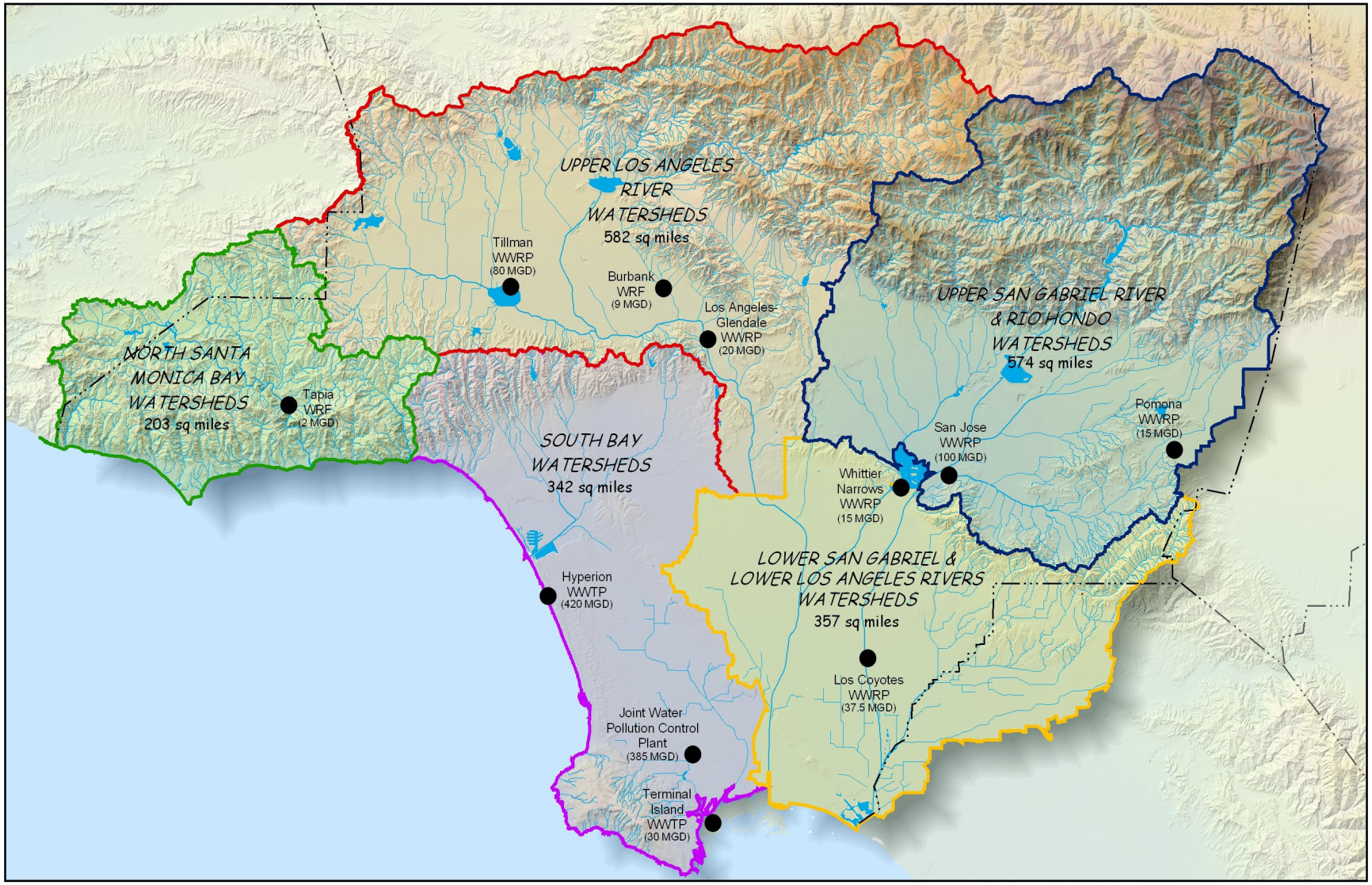
Nutrients, including nitrogen and phosphorous, are critical to the growth of plants. However, in high amounts, nutrients can result in excessive or accelerated growth of vegetation, such as algae, which can result in water quality impairment. Common sources of nutrients include fertilizers used in landscaping and agriculture, human and animal waste, and effluent from wastewater treatment facilities.

Bacteria and viruses are common contaminants in both urban runoff and stormwater. High levels of indicator bacteria (such as *Escherichia coli*) in stormwater sometimes results in the closure of beaches to contact recreation. Sources include sanitary sewer leaks and spills, illicit connections of sewer lines to the storm drain system, malfunctioning septic tanks, and fecal matter from humans, pets, and wildlife.

Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage from tanks, pipelines and old extraction sites, accidental spills, cleaning of vehicles and equipment, leaks in hydraulic systems, and the improper disposal of restaurant wastes and used oil.

Metals found in the Region's urban and stormwater runoff include lead, zinc, cadmium, copper, chromium, and nickel. Metals can be toxic to aquatic organisms and can bioaccumulate (accumulate to toxic levels in animals such as fish or birds). Many artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles and brake pads, or preserved wood) contain metals, which enter stormwater as those surfaces corrode, flake, dissolve, decay, or leach. During storms, many of the metals present in stormwater are attached to sediments.

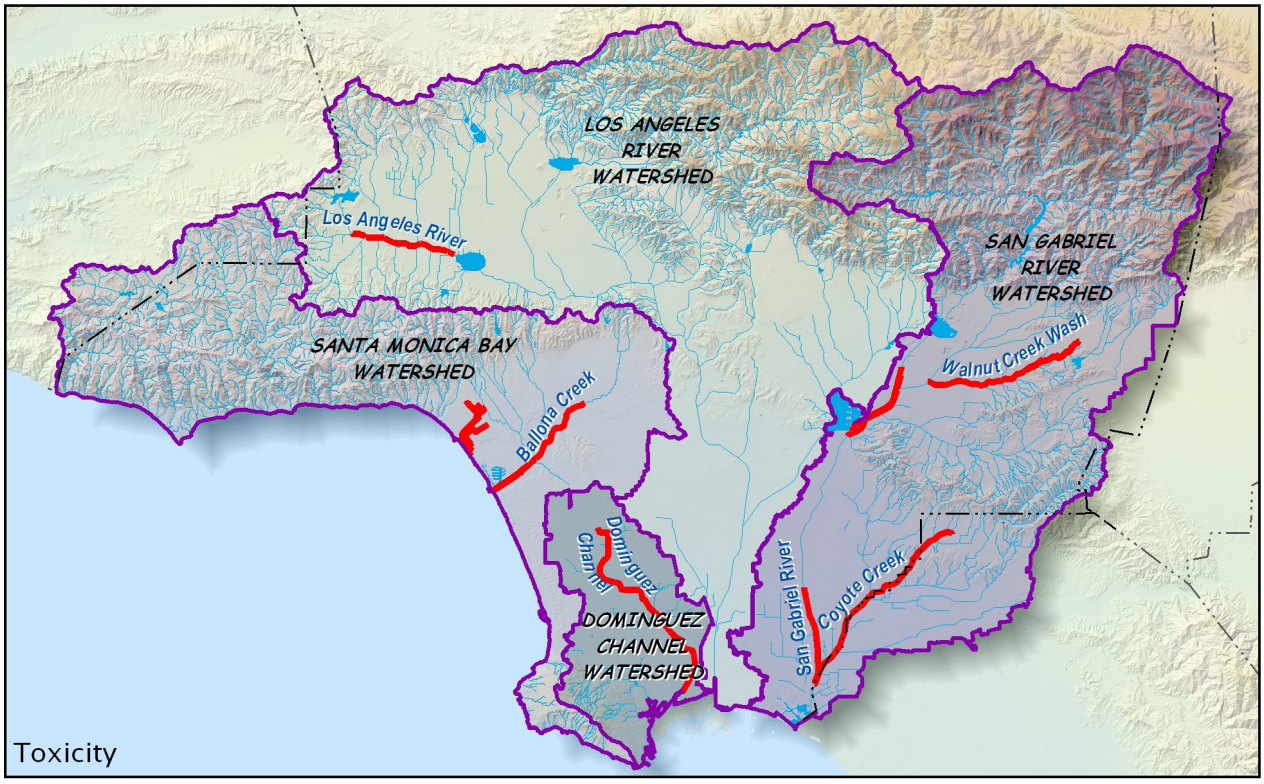
Organic compounds (e.g., adhesives, cleaners, sealants, solvents, etc.) and pesticides (e.g., herbicides, fungicides, rodenticides, and insecticides) may be found in urban and stormwater runoff in low concentrations. The widespread use of these substances and their improper disposal

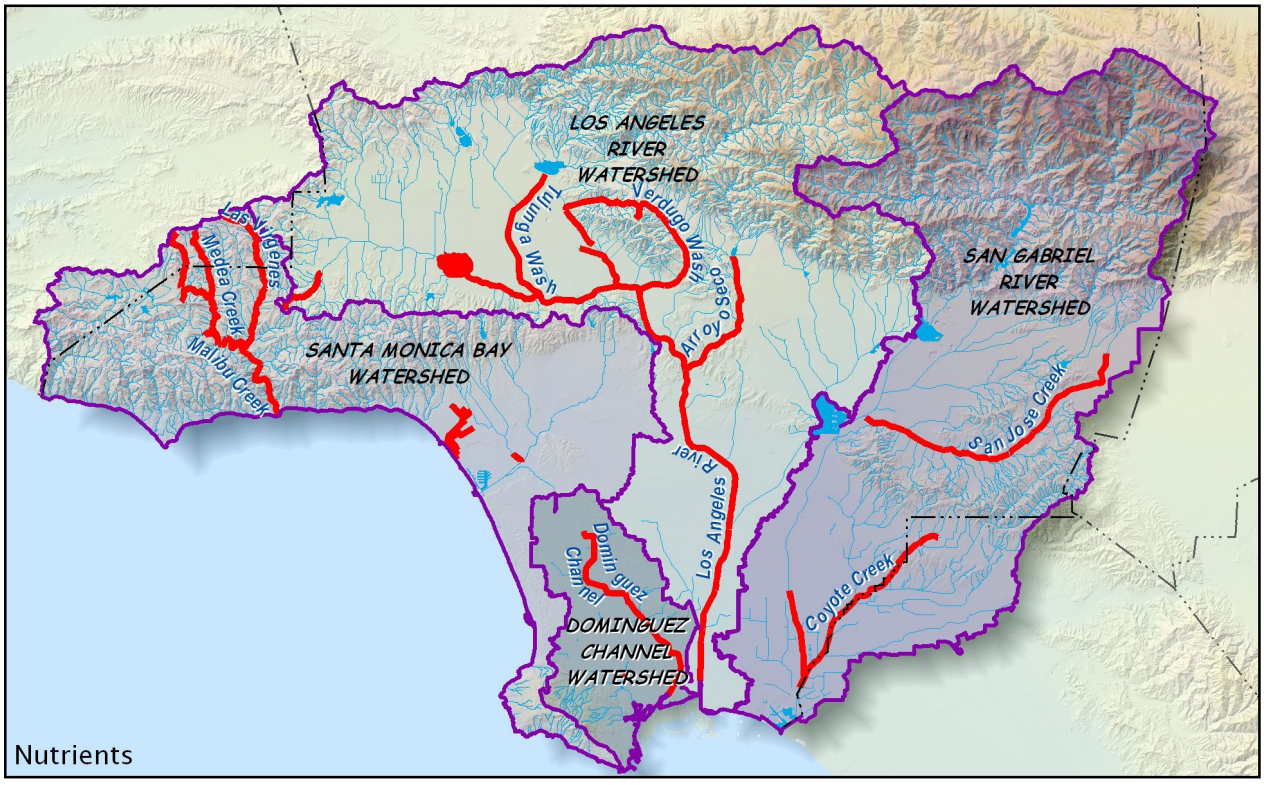


Major Dischargers

Greater Los Angeles County Region
Integrated Regional Water Management Plan

Map 2-5





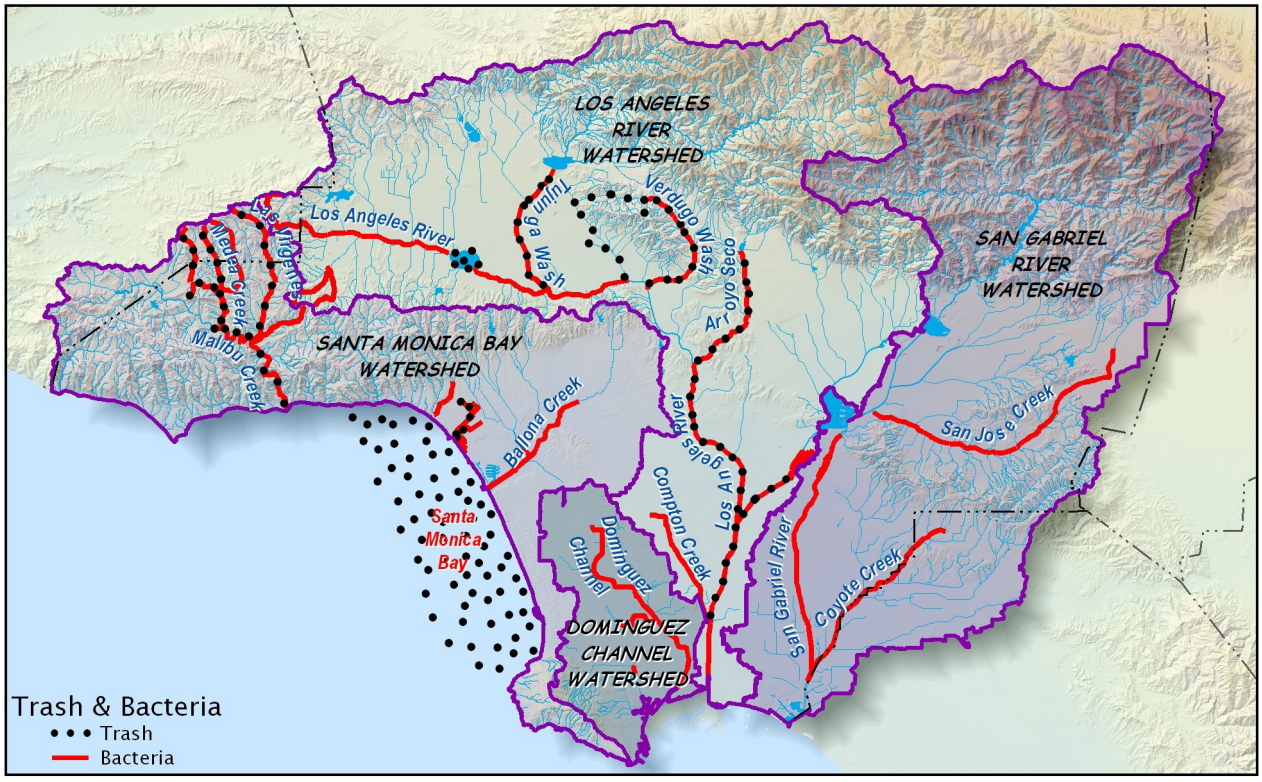
Miles
0 2.5 5 10

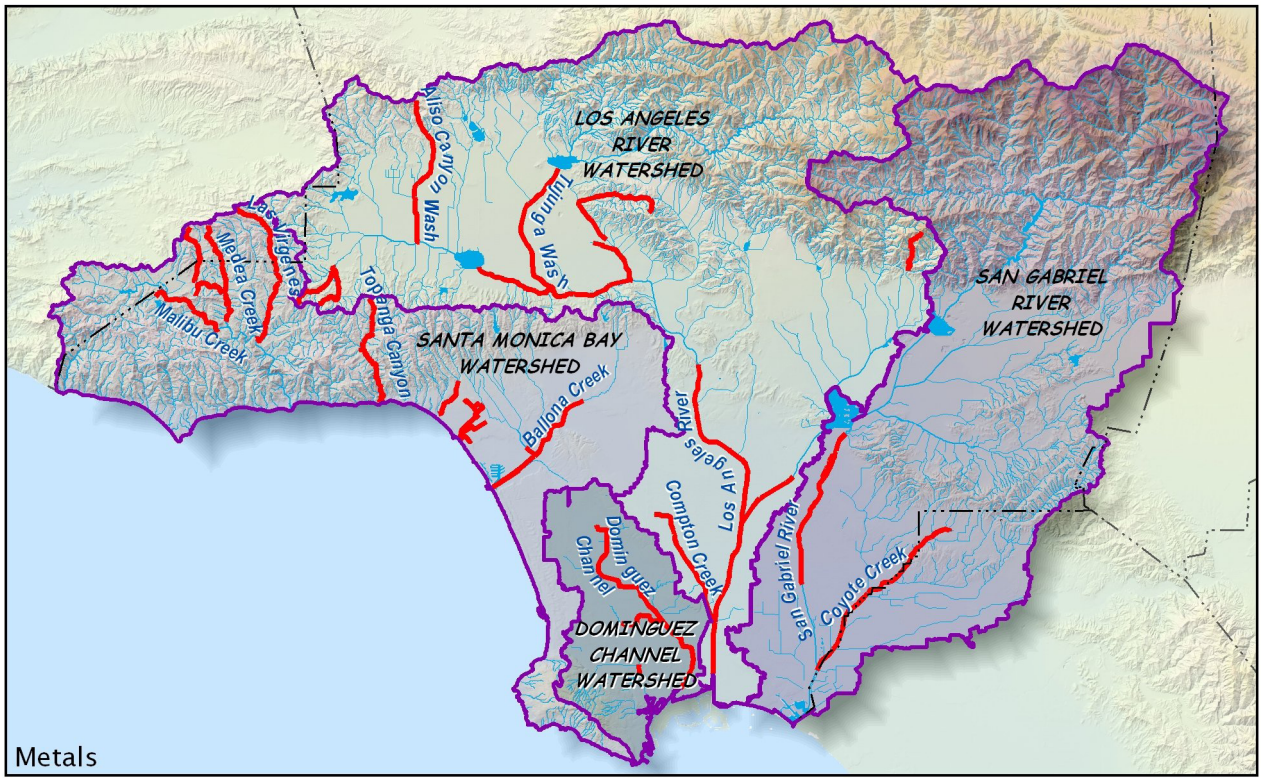
Sources: GreenVision, UEI, SCAG, CaSIL

County
Impairment
Streams, creeks & rivers
Lakes

Impaired Waterbodies

Greater Los Angeles County Region
Integrated Regional Water Management Plan
Map 2-6 (A)





Miles
0 2.5 5 10

Sources: GreenVision, UEI, SCAG, CaSIL

County
Impairment
Streams, creeks & rivers
Lakes

Impaired Waterbodies

Greater Los Angeles County Region
Integrated Regional Water Management Plan
Map 2-6 (B)

are the common sources of these compounds. Bioaccumulation of pesticides can have adverse effects on aquatic life and the animals that consume that life (e.g., seabirds that eat fish). Some of these substances were prohibited long ago due to negative impacts but are still detected in low concentrations (such as dichloro-diphenyl-trichloroethane [DDT]) and are now termed "legacy" pollutants.

Trash, debris, and other floatables are the result of the improper use, storage, and disposal of packaging and other products in urban environments, plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. In addition to negative aesthetic impacts, these substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in water bodies.

Groundwater Quality

Groundwater quality varies throughout the Region, based on naturally occurring conditions, historical land use patterns, and groundwater extraction patterns.

Naturally occurring soil and geologic conditions in the region often result in elevated levels of dissolved solids in groundwater (measured in terms of TDS). Commonly referred to as "hard" water, these dissolved solids include inorganic salts (including calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and small amounts of organic matter. Increases in groundwater TDS concentrations are a function of the recharge of storm and urban runoff, imported water, and incidental recharge. They are also attributed in part to the legacy of salt contamination from past agricultural and land uses, including fertilizer use and waste disposal.

Groundwater quality in some portions of the Region has been degraded by elevated levels of nitrates primarily from past agricultural land use practices and plumes of volatile organic compounds (VOCs) from the past disposal of industrial solvents. These include trichloroethylene (TCE), a common degreaser and cleaning product, and perchloroethylene (PCE), commonly used in dry cleaning of clothing. In addition, perchlorate contamination, associated with the manufacturing and testing of solid rocket propellants, is another major concern. The solid salts of ammonium perchlorate, potassium perchlorate, or sodium perchlorate are soluble in water and can

Santa Monica Beach. Continual improvement of the Region's surface water quality supports recreation at its many beaches.

persist for decades. Groundwater contamination has also occurred in some locations from the use of methyl tertiary butyl ether (MBTE) a gasoline additive used to increase octane ratings and reduce emissions. Although the use of MTBE was discontinued in 2003 (following the discovery of MBTE in groundwater wells in the City of Santa Monica), many underground gasoline storage tanks leaked and created the potential for contamination. Groundwater clean up efforts are being coordinated by various agencies and cities, including the San Gabriel Basin WQA.

The cost of treating these contaminants so that groundwater supplies can be optimized is often significant. Additionally, effective treatment has not yet been identified for some chemicals and testing needs to be performed of different treatment methods prior to identifying the preferred treatment alternative. Some of the contamination is extensive and several sites are on EPA's National Priorities List for remediation. The cost to treat this groundwater is typically in the millions of dollars.

One example is the Baldwin Park area where VOCs have been detected at 1000 times above the established maximum contaminant levels (MCLs). Although responsible parties, who are obligated to pay for the remediation, were identified, it has taken years for this remediation project to begin. Although the VOCs were identified in the 1980s and an agreement was reached in the late 1990s to begin treatment, other contaminants were subsequently found and new treatment methods had to be identified. In 2000, treatment of the VOCs, N-nitrosodimethylamine (NDMA), and perchlorate began. Additional programs are planned or underway.

The extraction of groundwater above natural replenishment levels and the subsequent intrusion of seawater have adversely affected groundwater quality at some coastal locations in the Region since the 1940's. Seawater intrusion can degrade water quality such that wells become unusable and reduce available aquifer storage. Los Angeles County operates and maintains three seawater intrusion barrier systems along the coast that utilize treated wastewater and imported water to reduce the seawater intrusion in coastal aquifers.

2.8 Environmental Resources

Wetlands

The Region is estimated to have lost over 90 percent of its coastal wetlands. According to the Coastal Conservancy, within the Los Angeles River watershed, 100 percent of the original lower riverine and tidal marsh and 98 percent of all inland freshwater marsh and ephemeral ponds have been drained or filled (California Resources Agency, 2001). Similar loss occurred with the channelization and improvement of the Region's creeks. Currently, two expansive areas of coastal wetlands remain: the Los Cerritos wetlands complex, and the Ballona wetlands and lagoons near the mouth of Ballona Creek. Other remaining historic wetland areas include the El Dorado wetlands near the confluence of Coyote Creek and the San Gabriel River; the lower reach of Compton Creek where the channel bottom is unlined; some limited saltwater marsh along the banks at the lowest reach of the Los Angeles River (SCWRP, 2001 and Resources Agency, 2001), and the coastal lagoons in the North Santa Monica Bay Watersheds, including Malibu, Trancas, and Topanga Creek Lagoons.

After a long history of widespread destruction and degradation, wetlands have belatedly been recognized as performing many valuable, even critical roles in the environment. Wetlands can

Baldwin Hills is one of the few remaining preserves of large open space in the heart of the Region.

function as sources, sinks and transformers of chemical, genetic and biological materials. They have been likened to "the kidneys of the landscape" for the role they play in hydrologic and chemical cycles, and in improving water quality (Mitsch & Gosselink, 1986). Functional wetlands (e.g., those that retain their natural ecological functions) have been shown to cleanse polluted waters, prevent or mitigate floods, protect shorelines and channel banks, and recharge groundwater aquifers. Additionally, wetlands provide unique and critical habitats for large numbers of flora and fauna. Thus, expansion and restoration of existing wetlands which retain natural functions, and development of constructed wetlands which recreate natural functions have the potential to improve water quality, improve flood protection, restore or create habitat, and enhance groundwater recharge.

Riparian Habitat

Riparian habitat is typically a linear corridor of variable width that occurs along perennial, intermittent, and ephemeral streams and rivers. In undisturbed areas, two distinguishing features of riparian ecosystems are the hydrologic interaction that occurs between the stream channel and adjacent areas through periodic exchange of surface water and groundwater, and the distinctive geomorphic features and vegetation communities that develop in response to this hydrologic interaction.

Due to the extensive urbanization on the coastal plain and inland valleys, current riparian habitat within the Region bears little resemblance to the pre-development conditions. Faber et al. (1989) estimated that 90 to 95 percent of the riparian habitat has been lost. Most native riparian habitat in the Region is located in the Santa Monica and San Gabriel Mountains, although some riparian corridors occur along the upper and middle reaches of the San Gabriel River, including portions of Walnut, San Jose, and Coyote Creeks, the Chino, Puente, and Simi Hills, and the Verdugo and Santa Susana Mountains. In-stream riparian habitat also occurs in the upper San Gabriel River and streams in the San Gabriel foothills, the Whittier Narrows, Sepulveda Basin, Hansen Dam, and the Glendale Narrows. Although the San Gabriel Mountains contain some large areas of quality riparian habitat, much of the other riparian habitat in the Region is increasingly stressed by recreational use, exotic species, hydrologic modifications, natural disturbance such as fires and drought, and encroaching development. In regional parks, recreation areas, and other protected areas, patches of natural or nearly natural habitat of varying size remain, supporting native species of plants and animals. Substantial portions of the remaining riparian habitat are located on private lands.

Where riparian habitats remain within or adjacent to urbanized areas, conditions are often impaired by degraded water quality, altered hydrologic conditions, encroachment on, and modification of, adjacent "buffer" habitat, and modified sediment transport. Water quality impairments generally include increases in 1) water temperature; 2) non-toxic elements such as sediment and nutrients; and 3) toxic contaminants such as pesticides and heavy metals. Since functional riparian vegetation and wetlands can improve water quality by removing or sequestering many contaminants, the widespread loss of riparian and wetland habitat and/or reduction of their normal functions have reduced the potential for these natural systems to enhance water quality, provide flood protection, recharge groundwater, and serve as wildlife corridors.

Significant Ecological Areas and Environnmentally Sensitive Habitat Areas

Significant Ecological Areas (SEAs) are ecologically important areas that are designated by the County of Los Angeles as having valuable plant or animal communities. Similar to the SEAs are Environmenally Sensitive Habitat Areas (ESHAs), which are designated by the Coastal Commission via local coastal programs. Terrestrial or aquatic habitat can qualifies for recognition as an SEA or ESHA if the habitat possesses one or more of the following features, or classes:

- Habitat of rare, endangered, or threatened plant or animal species;
- Represents biotic communities, vegetative associations, or habitat of plant or animal species that are either one-of-a-kind, or are restricted in distribution on a regional basis;

As much as 20 miles of steelhead fishery will be restored with removal of barriers like this "Texas Crossing" in Malibu Creek.

- Represents biotic communities, vegetative associations, or habitat of plant or animal species that are either one-of-a-kind, or are restricted in distribution in Los Angeles County;
- Habitat that at some point in the life cycle of a species or group of species serves as a concentrated breeding, feeding, resting, or migrating grounds, and is limited in availability;
- Represents biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or they represent an unusual variation in a population or community;
- An area important as game species habitat or as fisheries;
- An area that would provide for the preservation of relatively undisturbed examples of the natural biotic communities in Los Angeles County; and
- A special area worthy of inclusion, but one that does not fit any of the other seven criteria

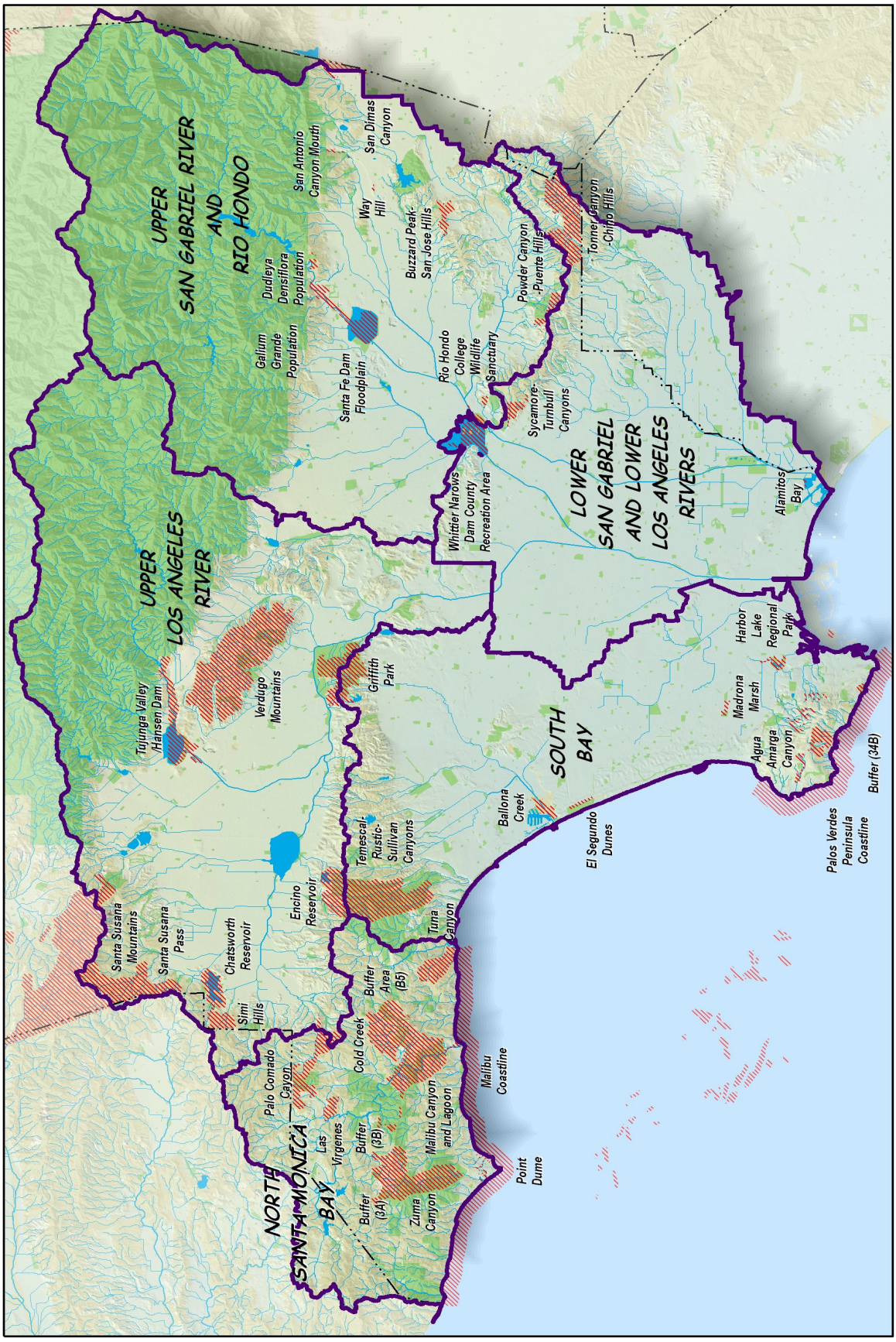
SEAs are offered certain protections within the unincorporated portions of Los Angeles County. Development proposals located within a SEA and outside incorporated City boundaries are reviewed by the Significant Ecological Area Technical Advisory Committee (SEATAC) which recommends changes to the project and mitigation measures to protect the habitat. The County of Los Angeles is in the process of updating the SEA designations and policies. Current SEAs within Los Angeles County are depicted on Map 2-7.

Area of Special Biological Significance

In the mid-1970s, to protect sensitive coastal habitats, the SWRCB designated 34 areas on the coast of California as Areas of Special Biological Significance (ASBS[2]), including the area between Mugu Lagoon in Ventura County and Latigo Point in Los Angeles County. Several watersheds in the North Santa Monica Bay drain to the eastern portion of this ASBS, between Sequit Point (near the Los Angeles County line) and Latigo Point, which begins at the intertidal zone and extends 1,000 feet from the shore (or to a depth of 100 feet, whichever is greater). The California Coastal Commission has designated all watershed lands adjacent to an ASBS as Critical Coastal Areas (CCA). Thus, development in this CCA and runoff from that area is subject to special conditions.

The land form along this portion of the ASBS generally consists of a coastal bluff with cliffs along the shoreline, except at Zuma Beach, where the coastal bluff is separated from the shore by a wide sandy beach. Vegetation types in the adjacent

[2] *In January, 2003, the SWRCB renamed ASBS as State Water Quality Protection Areas, although many sources still refer to the original term.*


UPPER SAN GABRIEL RIVER AND RIO HONDO
UPPER LOS ANGELES RIVER
LOWER SAN GABRIEL AND LOWER LOS ANGELES RIVERS
SOUTH BAY
NORTH SANTA MONICA BAY
Santa Susana Mountains
Santa Susana Pass
Chatsworth Reservoir
Simi Hills
Palo Comado Canyon
Las Virgenes
Cold Creek
Buffer Area (B5)
Buffer (3B)
Buffer (3A)
Malibu Canyon and Lagoon
Malibu Coastline
Zuma Canyon
Point Dume
Encino Reservoir
Temescal-Rustic-Sullivan Canyons
Tuna Canyon
Tujunga Valley Hansen Dam
Verdugo Mountains
Griffith Park
Ballona Creek
El Segundo Dunes
Santa Fe Dam Floodplain
Galium Grande Population
Dudleya Densiflora Population
San Antonio Canyon Mouth
San Dimas Canyon
Way Hill
Buzzard Peak-San Jose Hills
Rio Hondo College Wildlife Sanctuary
Whittier Narrows Dam County Recreation Area
Powder Canyon-Puente Hills
Tonner Canyon-Chino Hills
Sycamore-Turnbull Canyons
Alamitos Bay
Harbor Lake Regional Park
Madrona Marsh
Agua Amarga Canyon
Palos Verdes Peninsula Coastline
Buffer (34B)
Significant Ecological Areas
Greater Los Angeles County Region
Integrated Regional Water Management Plan
Map 2-7
Rivers, creeks, and streams
Reservoirs
Significant ecological areas
Parks
Other open space
Miles
0 2 4 8
Sources: GreenVision, UEI, SCAG, CaSIL

onshore areas include coastal strand, coastal sage scrub and riparian woodland (where several intermittent streams reach the coast). Subtidal habitat types along this ASBS include exposed rock reefs and kelp beds, semi-protected sandstone reefs and kelp beds, shallow sands, and deeper sands along most of the ASBS (SWRCB, 1979).

Runoff in this area includes stormwater discharge from roads (including State Highway 1) and some dry-weather urban runoff from the mostly residential development along the coast and in upland areas. Several beaches along this area are 303(d)-listed for beach closures and high coliform bacteria counts.

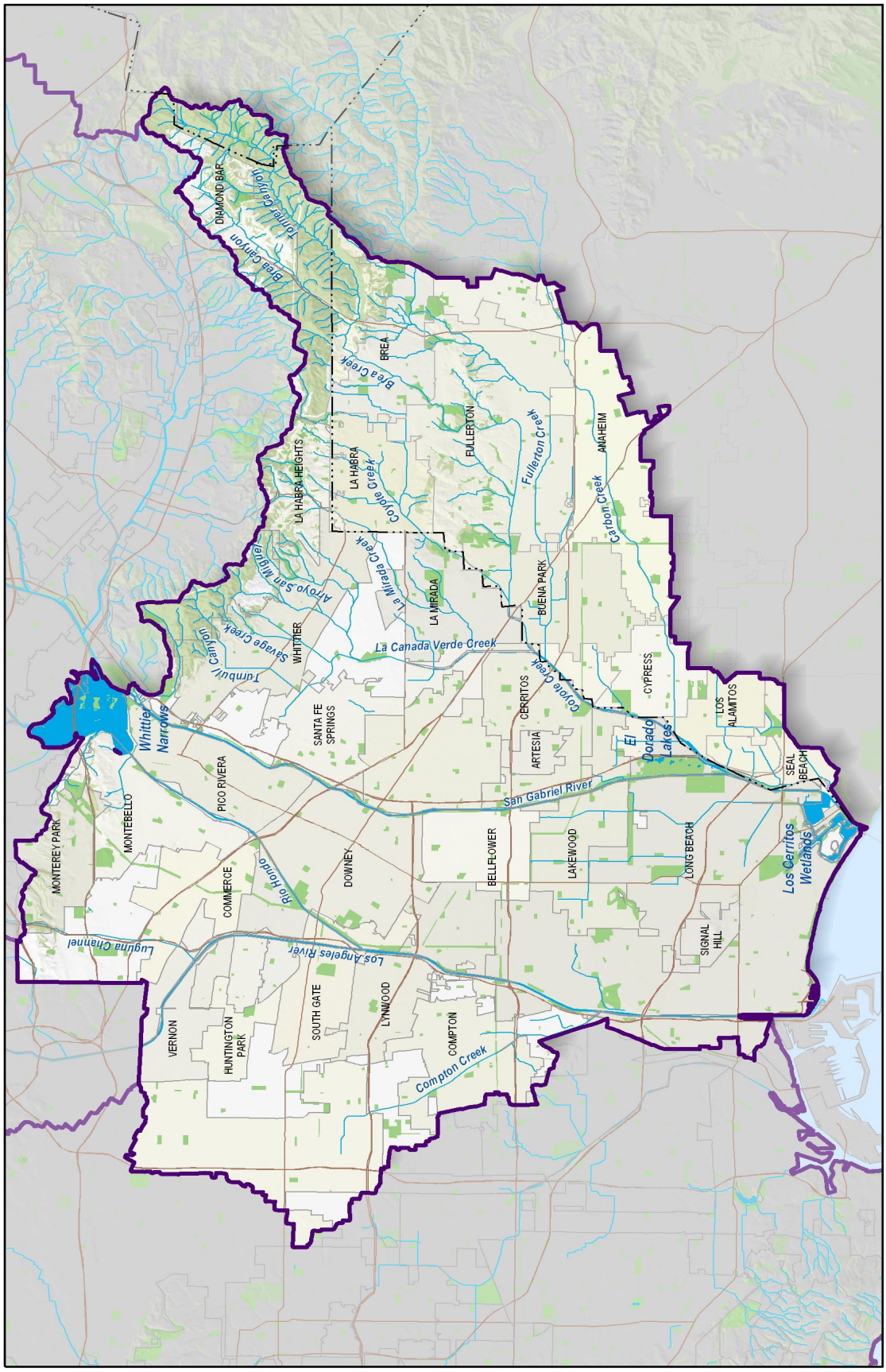
The Public Resources Code prohibits the discharge of point source waste and thermal discharges into an ASBS, except by special conditions. In addition, the California Ocean Plan prohibits the discharge of dry-weather runoff from nonpoint sources into an ASBS, although the City of Malibu and the County of Los Angeles have both requested exemptions from this prohibition. If granted, the RWQCB may allow discharges to be covered under the appropriate NPDES permit, which could include provisions to minimize or eliminate dry weather flows and reduce stormwater pollutants draining to ASBS to maintain the quality of receiving waters.

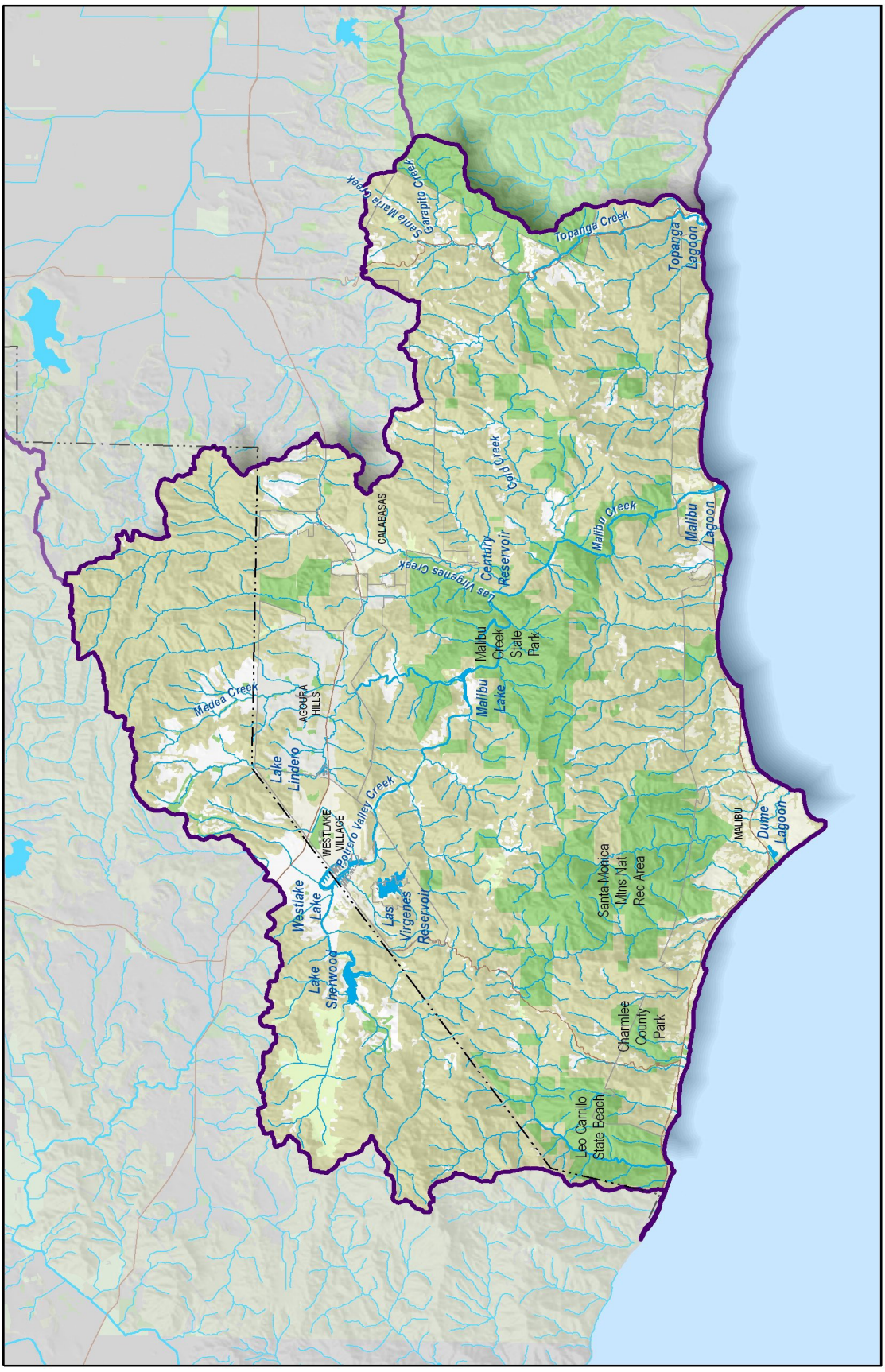
2.9 Open Space and Recreation

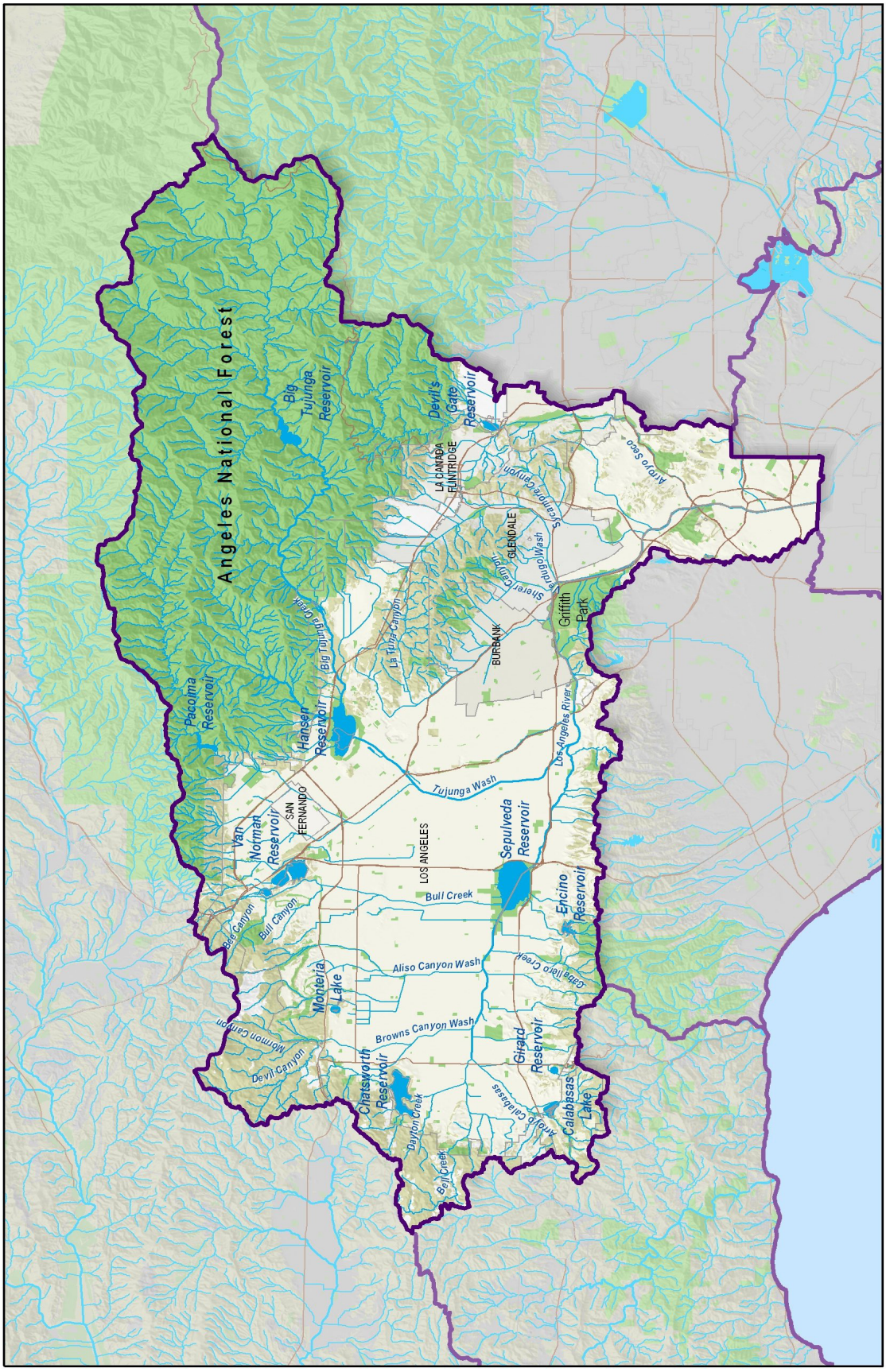
The Region's open space resources are extensive, due to the presence of large portions of the Angeles National Forest and the Santa Monica Mountains National Recreation Area. These natural areas provide large expanses of open space, which absorb rainfall that contributes to groundwater recharge and produce runoff that feeds local streams and the Region's two major rivers. This provides a substantial portion of the Region's water supply. The preservation of environmental resources within those areas is generally the responsibility of the Land Management Plan for the Southern California Forests and the Santa Monica Mountains Comprehensive Plan. Additional open space is located in the undeveloped portions of the foothills south of the Angeles National Forest, and throughout the Santa Monica, Santa Susanna and Verdugo Mountains, the Baldwin, Chino, and Puente Hills, and the Palos Verdes Peninsula. Protection of the open space in these areas is generally the responsibility of local Park Agencies and General Plans. Preservation of such spaces can protect existing water resources and native habitat, as these open spaces absorb rainfall, produce runoff that feeds local streams, and may contribute to groundwater. Watershed and open space plans, such as *Common Ground from the Mountains to the Sea*, also promote the preservation of these areas.

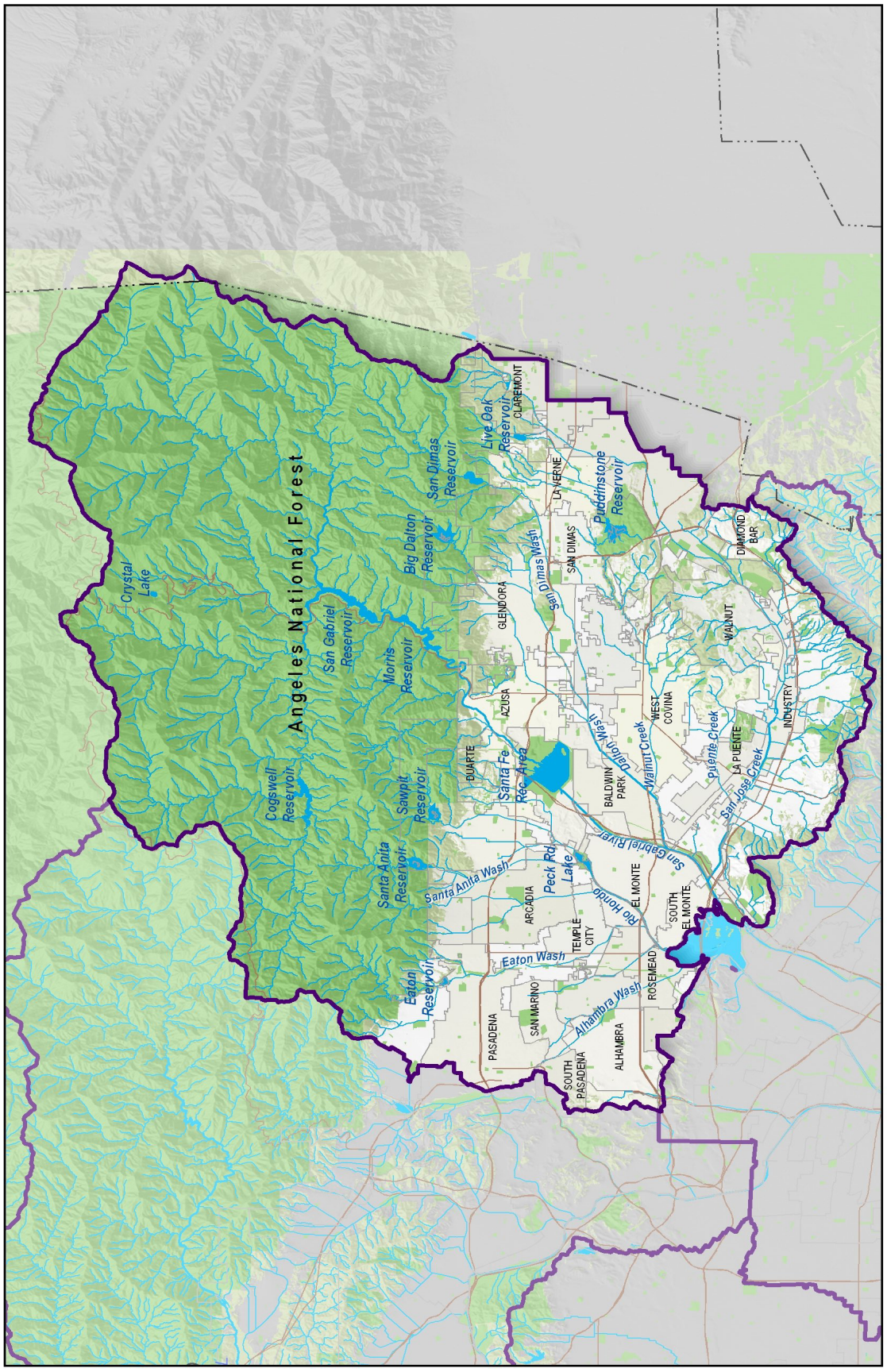
Excluding the large open spaces and other state lands in the upper portions of the watersheds, within the urbanized portions of the Region, there are over 1,000 parks with a combined total area of approximately 52,800 acres. Major open spaces and parks are depicted on Maps 2-8(A) through 2-8(E). With a current population of approximately 10.2 million, the Region has approximately 5.2 acres of parkland per 1,000 residents, although considerable variation exists between the Subregions. In some communities, which are proximate to large open spaces, access to parkland with active recreational opportunities is limited. The parkland to population ratio tends to be much lower in Disadvantaged Communities, where access to park space is as low as 0.8 acres per 1,000 residents. The National Recreation and Park Association suggests that a park system serving an urban area should, at a minimum, be composed of a "core" system of parklands, with a total of 6.25 to 10.5 acres of developed open space per 1,000 residents. Thus,

Arroyo Seco trail. The Region's open space resources are extensive. This plan includes targets to increase open space in disadvantaged communities.


Parks & Other Open Space
Lower San Gabriel & Lower Los Angeles Rivers Watersheds
Integrated Regional Water Management Plan
Map 2-8 (A)
Parks
Other open space
0 1.25 2.5 5
Miles
Sources: GreenVision, UEI, SCAG, CaSIL
Whittier Narrows
Los Cerritos Wetlands
El Dorado Lakes
San Gabriel River
Coyote Creek
Carbon Creek
Fullerton Creek
La Canada Verde Creek
Compton Creek
Los Angeles River
Rio Hondo
Laguna Channel
Brea Creek
Brea Canyon
Tonner Canyon
Turnbull Canyon
Arroyo San Miguel
Sawpit Creek
La Mirada Creek
Coyote Creek
DIAMOND BAR
BREA
FULLERTON
AMAHEIM
LA HABRA HEIGHTS
LA HABRA
WHITTIER
LA MIRADA
BUENA PARK
CYPRESS
LOS ALAMITOS
SEAL BEACH
SANTA FE SPRINGS
CERRITOS
ARTESIA
MONTEREY PARK
MONTEBELLO
PICO RIVERA
COMMERCE
DOWNEY
BELLFLOWER
LAKEWOOD
LONG BEACH
SIGNAL HILL
VERNON
HUNTINGTON PARK
SOUTH GATE
LYNWOOD
COMPTON

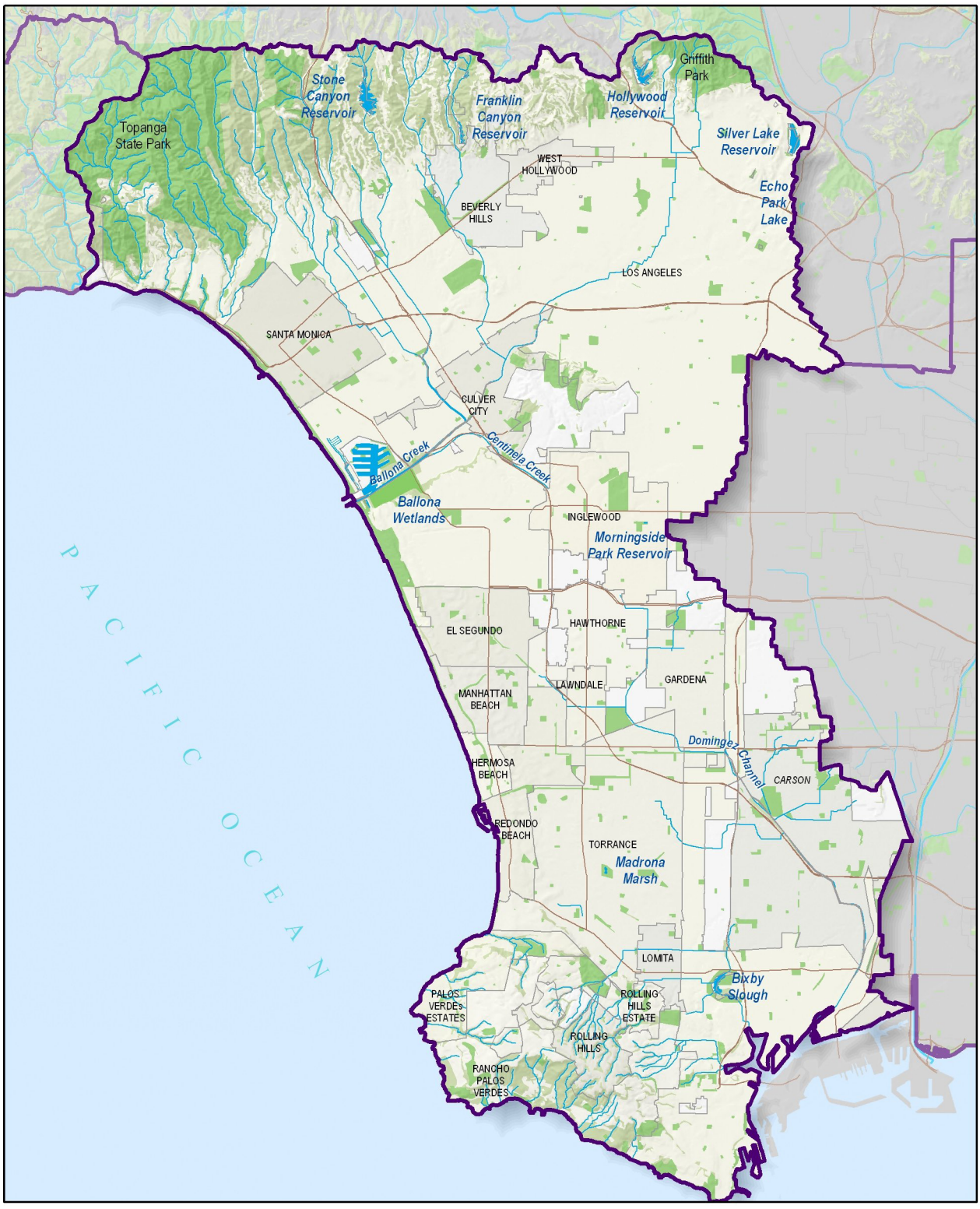

Parks & Other Open Space
North Santa Monica Bay Watersheds
Integrated Regional Water Management Plan
Map 2-8 (B)
Parks
Other open space
Agriculture
Miles
0
1
2
4
Sources: GreenVision, UEI, SCAG, CaSIL
Topanga Creek
Topanga Lagoon
Malibu Creek
Malibu Lagoon
Malibu Creek State Park
Malibu Lake
Century Reservoir
Las Virgenes Creek
Cold Creek
CALABASAS
Medea Creek
AGOURA HILLS
Lake Lindero
Lindero Canyon
WESTLAKE VILLAGE
Westlake Lake
Las Virgenes Reservoir
Lake Sherwood
Santa Monica Mtns Nat Rec Area
Charmlee County Park
Leo Carrillo State Beach
MALIBU
Dume Lagoon


Angeles National Forest
Big Tujunga Reservoir
Devils Gate Reservoir
Pacoima Reservoir
Hansen Reservoir
Van Norman Reservoir
Sepulveda Reservoir
Encino Reservoir
Monteria Lake
Chatsworth Reservoir
Girard Reservoir
Calabasas Lake
Tujunga Wash
Bull Creek
Aliso Canyon Wash
Browns Canyon Wash
Devil Canyon
Dayton Creek
Bell Creek
Bull Canyon
Beef Canyon
Momon Canyon
Big Tujunga Creek
La Tuna Canyon
Los Angeles River
Arroyo Seco
Verdugo Wash
Sycamore Canyon
Strarel Canyon
Arroyo Calabasas
Cabe Ilio Creek
LA CANADA FLINTRIDGE
GLENDALE
BURBANK
LOS ANGELES
SAN FERNANDO
Griffith Park
Parks & Other Open Space
Upper Los Angeles River Watersheds
Integrated Regional Water Management Plan
Map 2-8 (C)
Other open space
Parks
0 1.5 3 6
Miles
Sources: GreenVision, UEI, SCAG, CaSIL



Parks & Other Open Space

Upper San Gabriel River & Rio Hondo Watersheds
Integrated Regional Water Management Plan
Map 2-8 (D)



Parks & Other Open Space

South Bay Watersheds
Integrated Regional Water Management Plan
Map 2-8 (E)

current parkland in the Region is below this identified minimum recommendation.

Open space used for recreation and public access has the potential to optimize use of local water resources by preserving or enhancing groundwater recharge, and thereby improving water supply reliability and providing opportunities to reuse stormwater or recycled water for irrigation improve surface water quality, to the extent that it filters, retains, or detains stormwater runoff (although few existing parks or open spaces include specific features to improve the quality of stormwater runoff).

2.10 Ecological Processes

Although large portions of the Region have been subject to urban and suburban development, ecological processes still play an important role in the management of water resources. The large expanses of open space in the upper watersheds of the Los Angeles and San Gabriel Rivers and throughout the Santa Monica Mountains provide a substantial portion of Region's water supply.

Fire is an integral and necessary part of the natural environment and plays a role in shaping the landscape, yet the management of most open space areas historically relied on fire suppression which has resulted in open spaces with varying fuel loads. Catastrophic wildfire events can denude hillsides which create opportunities for invasive plants and increase the potential for subsequent rains to result in debris flows that erode the landscape and can clog stream channels, damage structures, and injure inhabitants in the canyons and lower foothill areas. In recent years, more enlightened open space management practices have attempted to incorporate fire as a natural force for renewal while minimizing risks to lives and property.

Invasive species in the Region have also substantially affected specific habitats and areas. Along with the rest of California, most the Region's native grasslands were long ago displaced by introduced species. The receptive climate has resulted in the widespread importation of plants from around the globe for landscaping. Some plant introductions have resulted in adverse impacts. In many undeveloped areas, non-native plants such as arundo (*Arundo donax*), tree of heaven (*Alianthus altissima*) tree tobacco (*Nicotiana glauca*), castor bean (*Ricinus communis*), salt cedar (*Tamarix ramosissima*) and cape ivy (*Senecio mikanioides)* are out-competing native

Table 2-4. Land Use (in Acres)

Land Use Category	Lower San Gabriel and Los Angeles Watersheds	North Santa Monica Bay Watersheds	South Bay Watersheds	Upper Los Angeles River Watershed	Upper San Gabriel River and Rio Hondo Watersheds	Region Totals	Percent
Agriculture	2,886	1,990	1,046	2,190	3,468	11,580	0.9
Commercial	33,839	1,746	27,689	21,061	20,829	105,164	8.1
Industrial	30,042	231	19,906	14,408	12,107	76,694	5.9
Recreation	10,182	1,995	8,496	8,279	9,431	38,382	2.9
Residential	117,214	12,992	105,045	117,288	91,039	443,578	34.0
Transportation, Communication, and Utilities	15,283	772	11,024	16,495	11,021	54,595	4.2
Vacant/Open Space	18,605	108,494	33,868	190,134	212,887	563,988	43.2
Other	1,726	1,573	2,627	2,368	3,983	12,277	0.9
Totals	229,776	129,791	209,701	372,224	364,766	1,306,258	100.0

Source: California State Los Angeles Urban Environment Initiative, Southern California Association of Governments

species because they are not edible to wildlife or lack natural predators such as disease and insects. Arundo, a tall bamboo-like grass that is prolific and difficult to eradicate, is probably the most invasive of the exotic plant species. In riparian areas, it takes up large amounts of water, crowds out native plants, clogs streams, and disrupts the balance for aquatic species. The removal of this particular species, which requires focused and repeated efforts, can provide substantial dividends in water savings and restored species diversity.

As noted earlier, limited wetland and riparian habitat remain within those areas subject to development. In locations where such habitat exists, contact with water is critical to long-term viability. To the extent that channelization of streams prevents natural percolation of water into the soil, and in some locations, the return of baseflow to stream channels, the continued presence of wetland and riparian vegetation cannot be ensured. The presence of riparian vegetation within soft-bottom portions of the rivers (e.g., the Los Angeles River in the Sepulveda Basin and Elysian Valley, the Rio Hondo in Whittier Narrows, and many locations along the San Gabriel River) creates habitat that has become dependent on runoff, which in some locations is supplemented by recycled water discharge from wastewater treatment plants. Consequently, the removal or redirection of that flow could adversely affect habitat in those locations. In addition, the proposed restoration of steelhead fisheries in the Santa Monica Mountains, such as Malibu Creek, may require that some recycled water discharge be maintained.

2.11 Land Use

Land Use within the Region reflects the historic pattern of urbanization, as most of the coastal plain and interior valleys are occupied with residential, industrial, commercial, and institutional uses, and most of the foothills and mountains are principally open space. A breakdown of land use in the Region is provided in Table 2-4, and depicted on Maps 2-9(A) through 2-9(E).

2.12 Social Characteristics

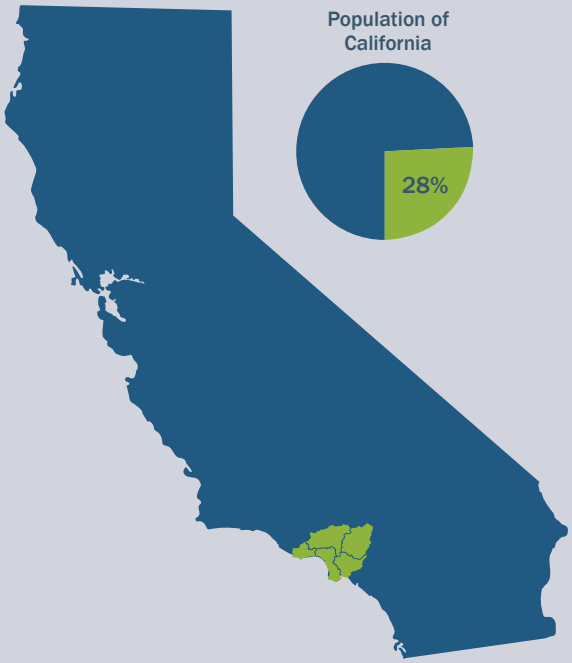
The Region's population is currently estimated at approximately 10.2 million residents as depicted on Table 2-5, which represents approximately 28 percent of the State's estimated 2006 population.

Per State Guidelines, Disadvantaged Communities are those with an annual median household income (MHI) that is less than 80 percent of the statewide annual median household income (CWC § 79505.5 (a)). Using Census 2000 data, 80 percent of the statewide annual MHI is $37,994. Those communities meeting these criteria are depicted in Map 2-10(A) through 2-10(D). Note that there are no Disadvantaged Communities in the North Santa Monica Bay Watersheds Subregion.

As depicted on these maps, Disadvantaged Communities are located throughout much of the Region. As discussed in the sections above, water management issues, such as a reliable water supply, poor surface water quality, and groundwater contamination also occurs throughout the Region. No specific relationship has been identified between the location of Disadvantaged Communities and the location of water resource management issues.

2.13 Social Trends and Concerns

The watershed management plans for many of the Region's major watersheds identify various goals, objectives, and guiding principles. Those various concepts are incorporated in this Plan as objectives in Section 3.1, but noted here as a reflection of the social and cultural values of the Region. They include: reduce dependence on imported water, optimize use of local water resources, enhance water supply reliability, improve the quality of urban runoff and stormwater, maintain and enhance flood protection, increase watershed-friendly recreation and accessible open space for all communities, conserve and restore native habitat, manage public open spaces to reduce the risk of catastrophic wildland fires, and promote the application of watershed approaches to resource management issues.

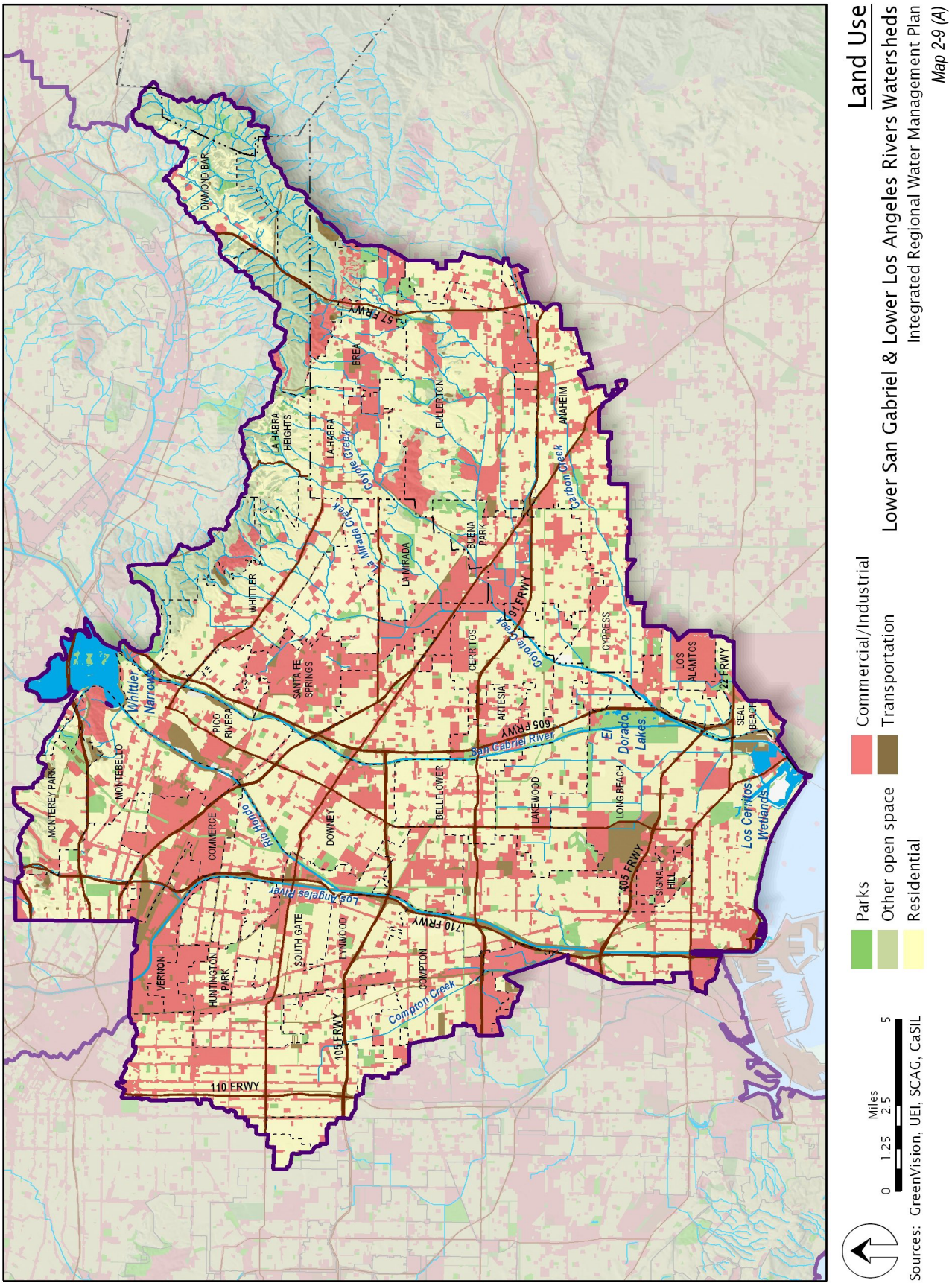


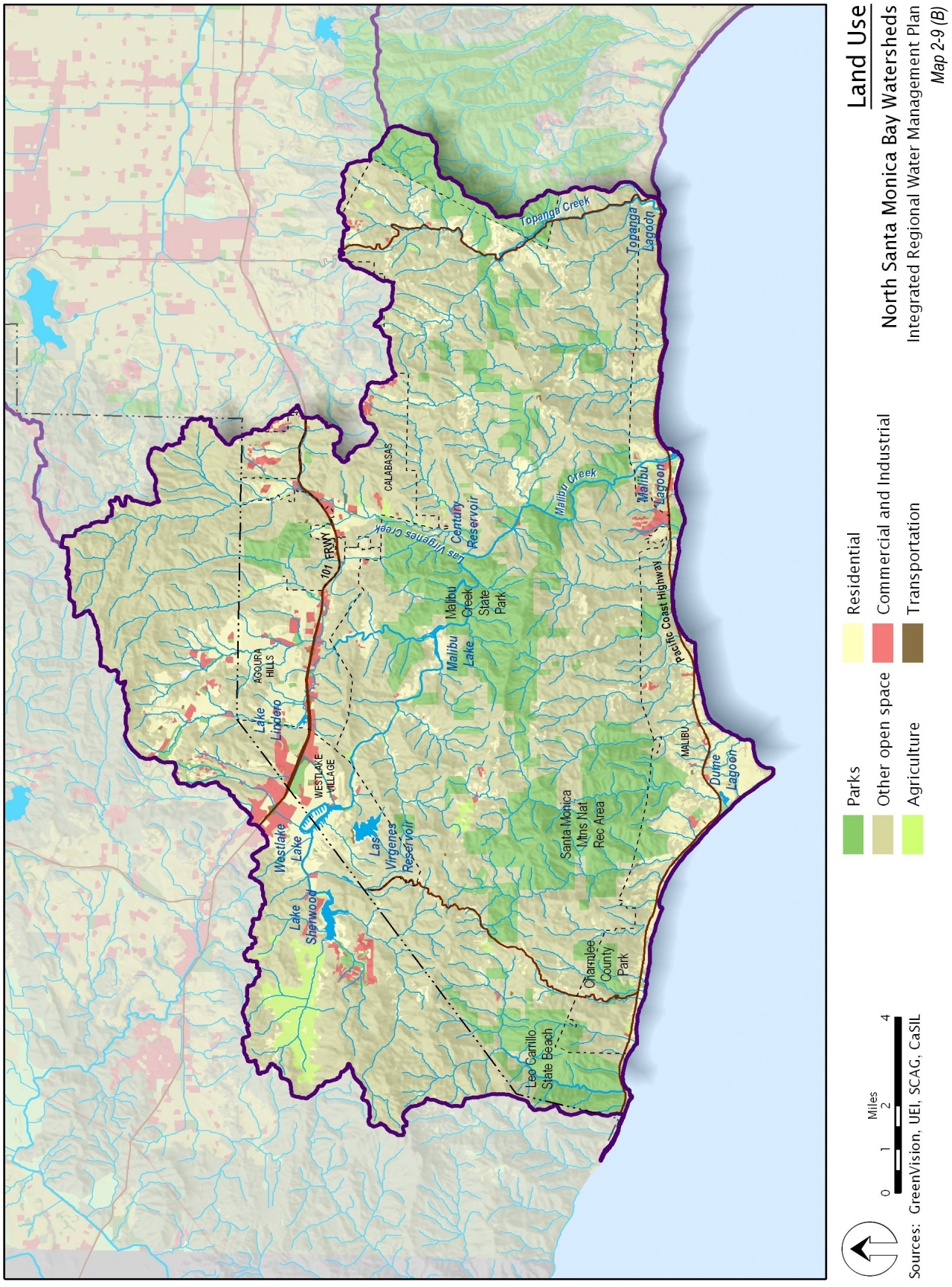
Subregion	Population
Lower San Gabriel and Los Angeles Rivers	3,219,316
North Santa Monica Bay	106,480
South Bay	2,903,382
Upper Los Angeles	2,338,290
Upper San Gabriel and Rio Hondo	1,640,528
The Greater Los Angeles County Region Total	10,207,996

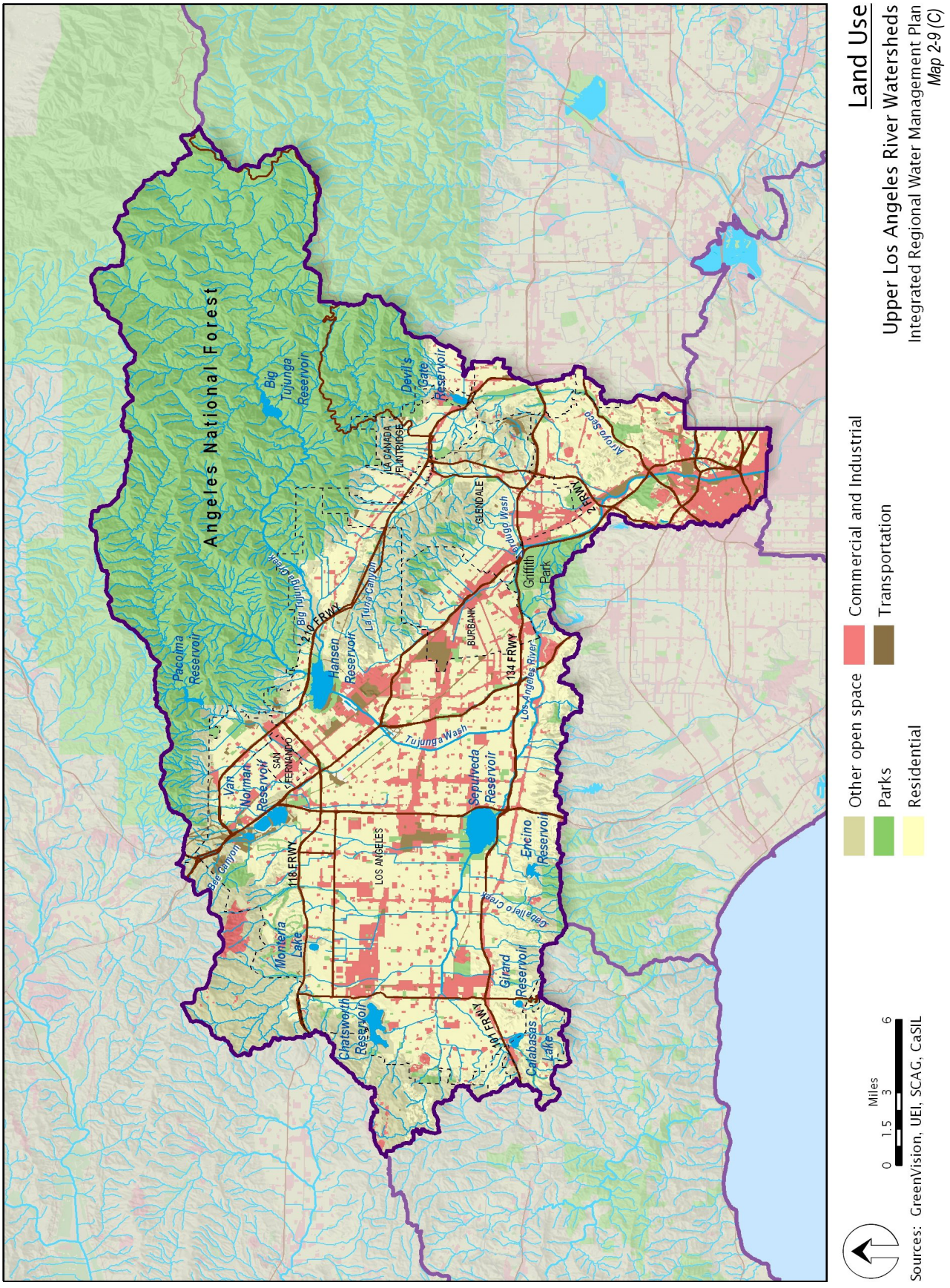
Figure 2-1. 2006 estimated Greater Los Angeles County Region population. The Greater Los Angeles County Region represents 28 percent of California's population.

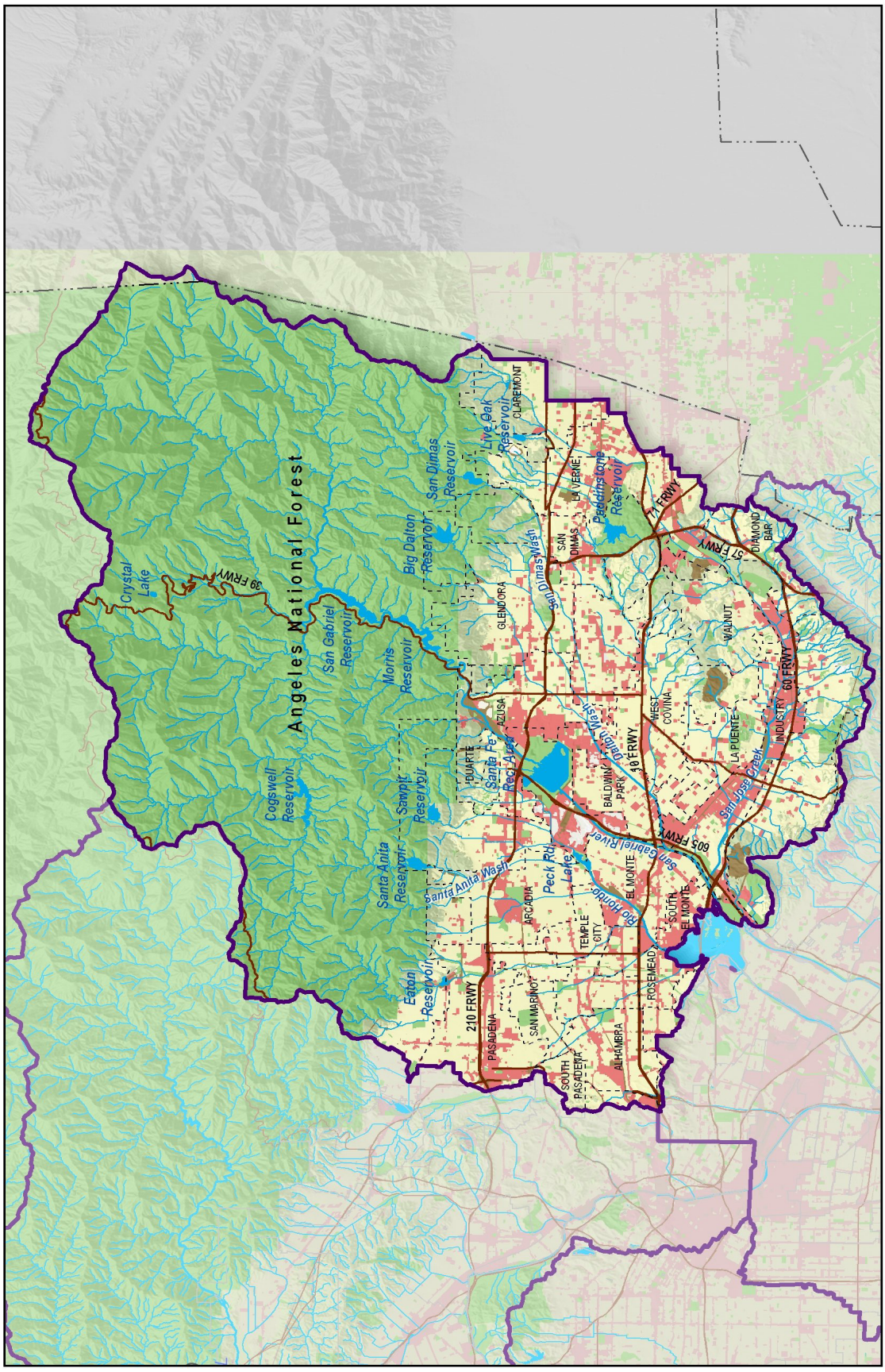
Social trends in the Region may be summarized on the basis of certain demographic trends. The Public Policy of California (PPIC) (PPIC, 2002) describes trends for portions of California, including Los Angeles, Ventura, and Orange Counties, and is representative of the Region. Population growth in the Region is slowing (a 10 percent increase from 1990-2000, down from a 20 percent increase from 1980-1990). In the last decade, births represented the largest portion of population increase in the Region, followed by international migration. Domestic migration was a net loss to the Region's population during that period. Population growth outpaced job growth (by more than 2:1) and growth in residential units, increasing the number of persons per household. Ethnic diversity continues to increase, as the percentage of Caucasian residents declines (from 58.percent in 1980, 47.0 percent in 1990, and 38.8 percent in 2000).

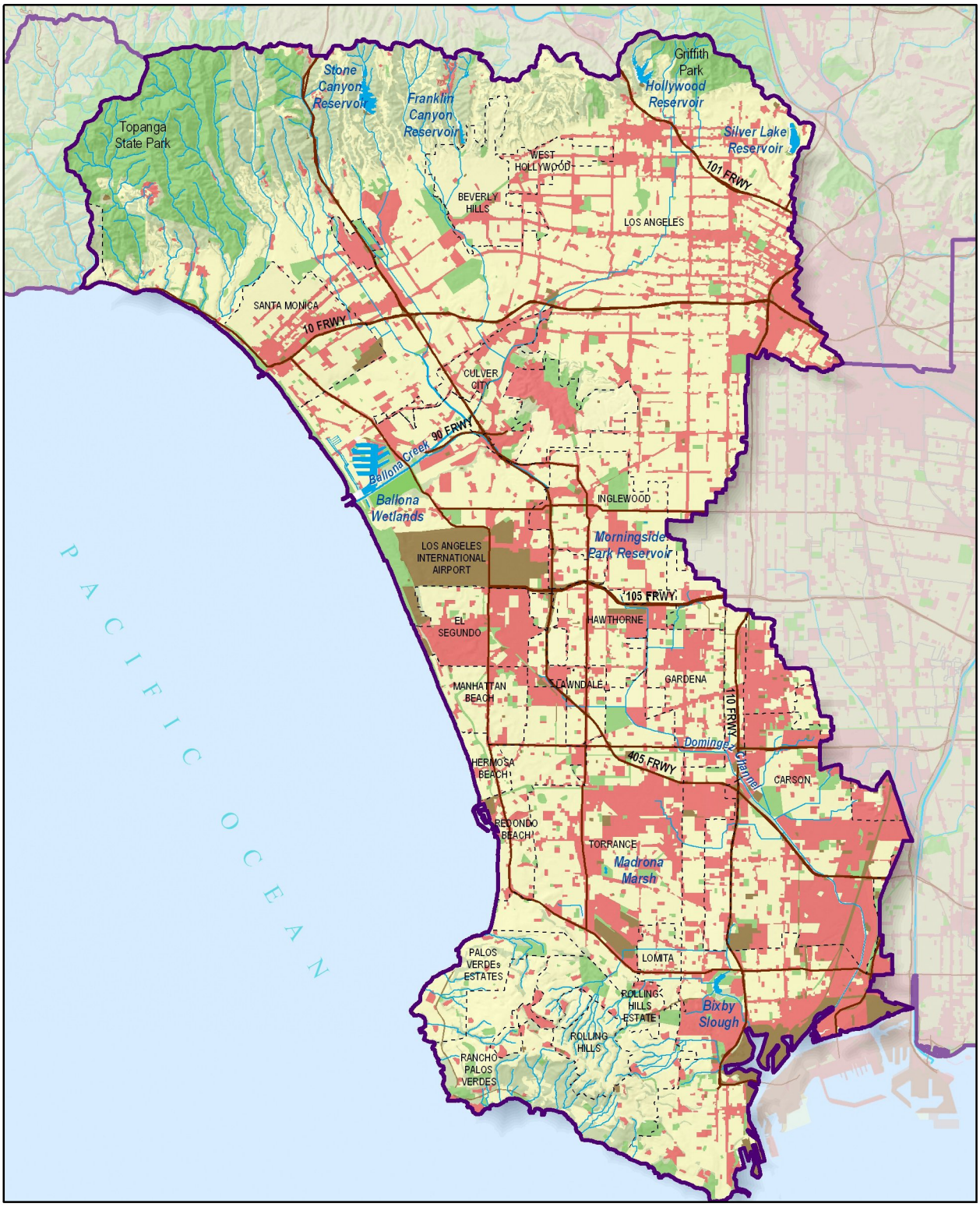
Social concerns in the Region may be reflected by a recent survey of Los Angeles residents (PPIC, 2005), which found that residents are unhappy with some key indicators of quality of life. Large majorities say traffic congestion on freeways and major roads (74 percent) and the availability of affordable housing (64 percent) are big problems in the County today. Majorities of residents still rate police protection (57 percent) and the quality of parks, beaches, and recreation facilities (58 percent) as excellent or good, but their assessments have fallen in recent years. Residents are far less charitable in their rating of other public services: Only one-third give excellent or good ratings to streets and roads (32 percent today, 51 percent in 2004) and public schools (36 percent today, 43 percent in 2004). In contrast, large majorities of residents in neighboring Orange County give excellent or good ratings to police protection (83 percent), recreational facilities (84 percent), streets and roads (64 percent), and public schools (64 percent). Los Angeles County residents are more likely to believe that Los Angeles County will be a worse place (37 percent) rather than a better place (24 percent) to live in 20 years, with 35 percent anticipating that quality of life in the county will stay the same. Fully one-third of county residents (33 percent) expect to leave Los Angeles County in the next five years, up from 17 percent in 2003.


Land Use
Lower San Gabriel & Lower Los Angeles Rivers Watersheds
Integrated Regional Water Management Plan
Map 2-9 (A)
Commercial/Industrial
Transportation
Parks
Other open space
Residential
0 1.25 2.5 5
Miles
Sources: GreenVision, UEI, SCAG, CaSIL
DIAMOND BAR
BREA
FULLERTON
ANAHEIM
LA HABRA HEIGHTS
LA HABRA
WHITTIER
LA MIRADA
BUENA PARK
CERRITOS
CYPRESS
LOS ALAMITOS
SEAL BEACH
SANTA FE SPRINGS
PICO RIVERA
ARTESIA
MONTEBELLO
MONTEREY PARK
COMMERCE
DOWNEY
BELLFLOWER
LAKEWOOD
LONG BEACH
SIGNAL HILL
VERNON
HUNTINGTON PARK
SOUTH GATE
LYNWOOD
COMPTON
57 FRWY
91 FRWY
605 FRWY
22 FRWY
405 FRWY
710 FRWY
105 FRWY
110 FRWY
Whittier Narrows
San Gabriel River
Rio Hondo
Los Angeles River
Coyote Creek
Carbon Creek
Compton Creek
El Dorado Lakes
Los Cerritos Wetlands


Land Use
North Santa Monica Bay Watersheds
Integrated Regional Water Management Plan
Map 2-9 (B)
Residential
Commercial and Industrial
Transportation
Parks
Other open space
Agriculture
Miles
0
1
2
4
Sources: GreenVision, UEI, SCAG, CaSIL
Topanga Creek
Topanga Lagoon
Malibu Creek
Malibu Lagoon
Las Virgenes Creek
Century Reservoir
Malibu Creek State Park
Malibu Lake
Pacific Coast Highway
Dume Lagoon
MALIBU
Santa Monica Mtns Nat Rec Area
Charmlee County Park
Leo Carrillo State Beach
Las Virgenes Reservoir
Westlake Lake
Lake Sherwood
WESTLAKE VILLAGE
Lake Lindero
AGOURA HILLS
CALABASAS
101 FRWY


Land Use
Upper Los Angeles River Watersheds
Integrated Regional Water Management Plan
Map 2-9 (C)
Commercial and Industrial
Transportation
Other open space
Parks
Residential
Miles
0 1.5 3 6
Sources: GreenVision, UEI, SCAG, CaSIL
Angeles National Forest
Big Tujunga Reservoir
Devil's Gate Reservoir
Pacoima Reservoir
Hansen Reservoir
Van Norman Reservoir
Sepulveda Reservoir
Encino Reservoir
Chatsworth Reservoir
Monteria Lake
Girard Reservoir
Calabasas Lake
Tujunga Wash
Los Angeles River
Griffith Park
GLENDALE
BURBANK
LA CANADA FLINTRIDGE
LOS ANGELES
SAN FERNANDO
210 FRWY
134 FRWY
118 FRWY
101 FREEWAY
5 FRWY


Angeles National Forest
Crystal Lake
39 FRWY
Cogswell Reservoir
San Gabriel Reservoir
Morris Reservoir
Sawpit Reservoir
Santa Anita Reservoir
Eaton Reservoir
Big Dalton Reservoir
San Dimas Reservoir
Live Oak Reservoir
Puddingstone Reservoir
210 FRWY
57 FRWY
605 FRWY
10 FRWY
60 FRWY
71 FRWY
Santa Anita Wash
Peck Rd Lake
San Gabriel River
Rio Hondo
San Jose Creek
Walnut Creek Wash
San Dimas Wash
Santa Fe Dam Rec Area
PASADENA
SOUTH PASADENA
ALHAMBRA
SAN MARINO
ARCADIA
TEMPLE CITY
ROSEMEAD
EL MONTE
SOUTH EL MONTE
BALDWIN PARK
AZUSA
IRWINDALE
GLENDORA
SAN DIMAS
LA VERNE
CLAREMONT
WEST COVINA
LA PUENTE
INDUSTRY
WALNUT
DIAMOND BAR
Land Use
Upper San Gabriel River & Rio Hondo Watersheds
Integrated Regional Water Management Plan
Map 2-9 (D)
Commercial/Industrial
Transportation
Parks
Other open space
Residential
0 1.25 2.5 5
Miles
Sources: GreenVision, UEI, SCAG, CaSIL



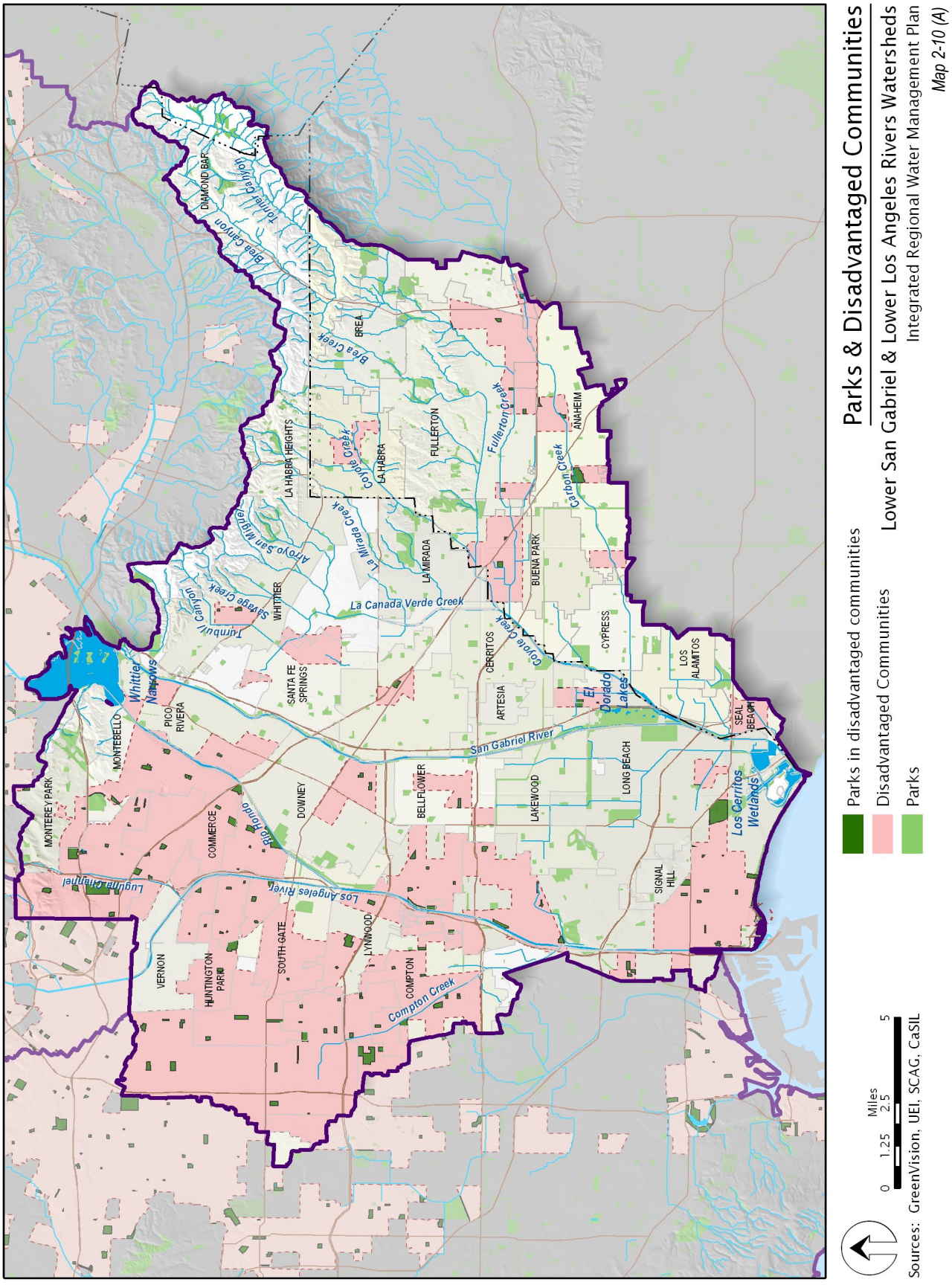
Miles
0 1.25 2.5 5

Sources: GreenVision, UEI, SCAG, CaSIL

- Other open space
- Parks
- Residential
- Commercial and Industrial
- Transportation

Land Use

South Bay Watersheds
Integrated Regional Water Management Plan
Map 2-9 (E)


Parks & Disadvantaged Communities
Lower San Gabriel & Lower Los Angeles Rivers Watersheds
Integrated Regional Water Management Plan
Map 2-10 (A)
Parks in disadvantaged communities
Disadvantaged Communities
Parks
Miles
0 1.25 2.5 5
Sources: GreenVision, UEI, SCAG, CaSIL
Whittier Narrows
San Gabriel River
Los Cerritos Wetlands
El Dorado Lakes
La Canada Verde Creek
Coyote Creek
Carbon Creek
Fullerton Creek
Brea Creek
Compton Creek
Los Angeles River
Rio Hondo
Arroyo San Miguel
Turnbull Canyon
Tonner Canyon
Lugonia Channel
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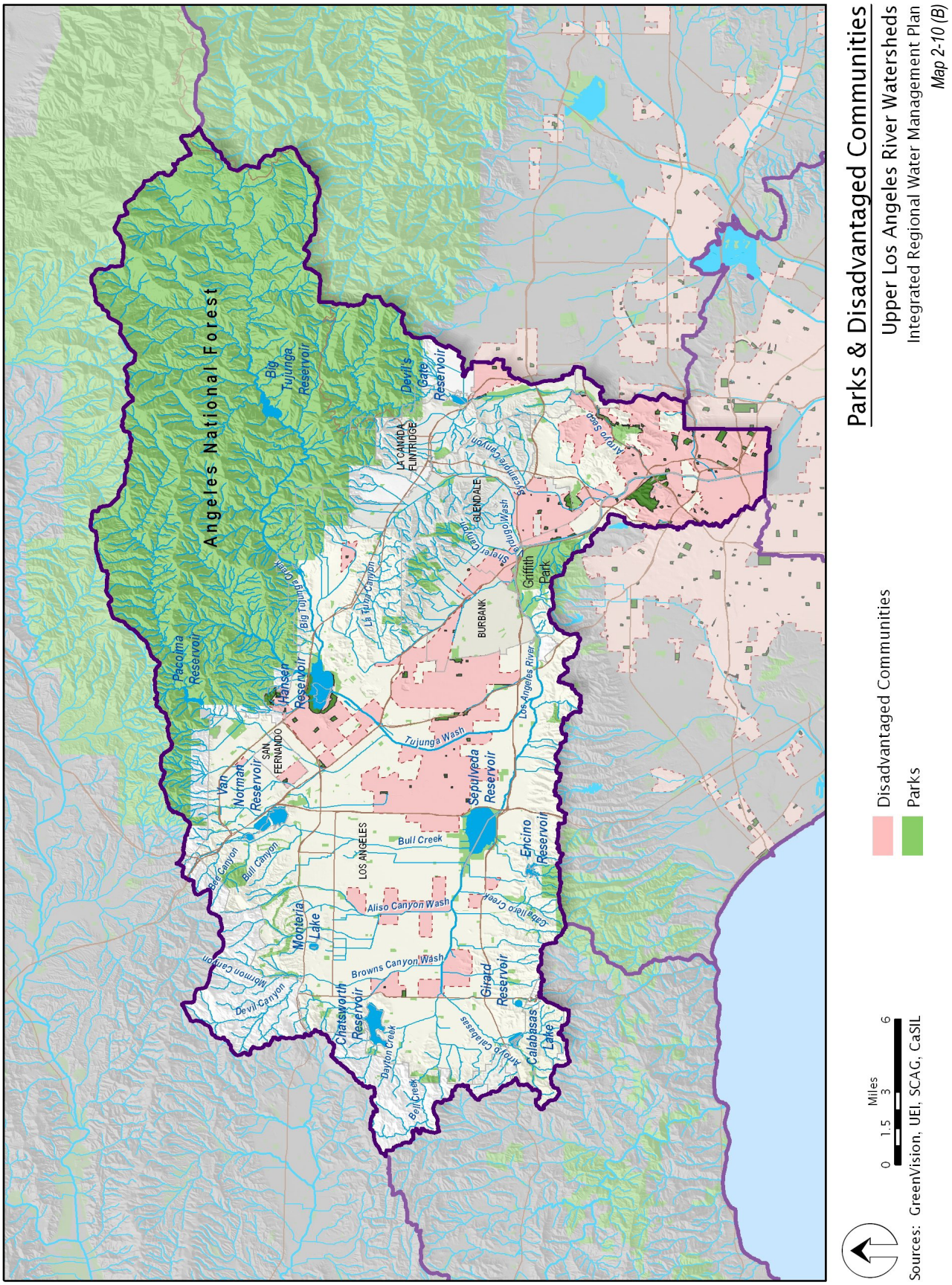
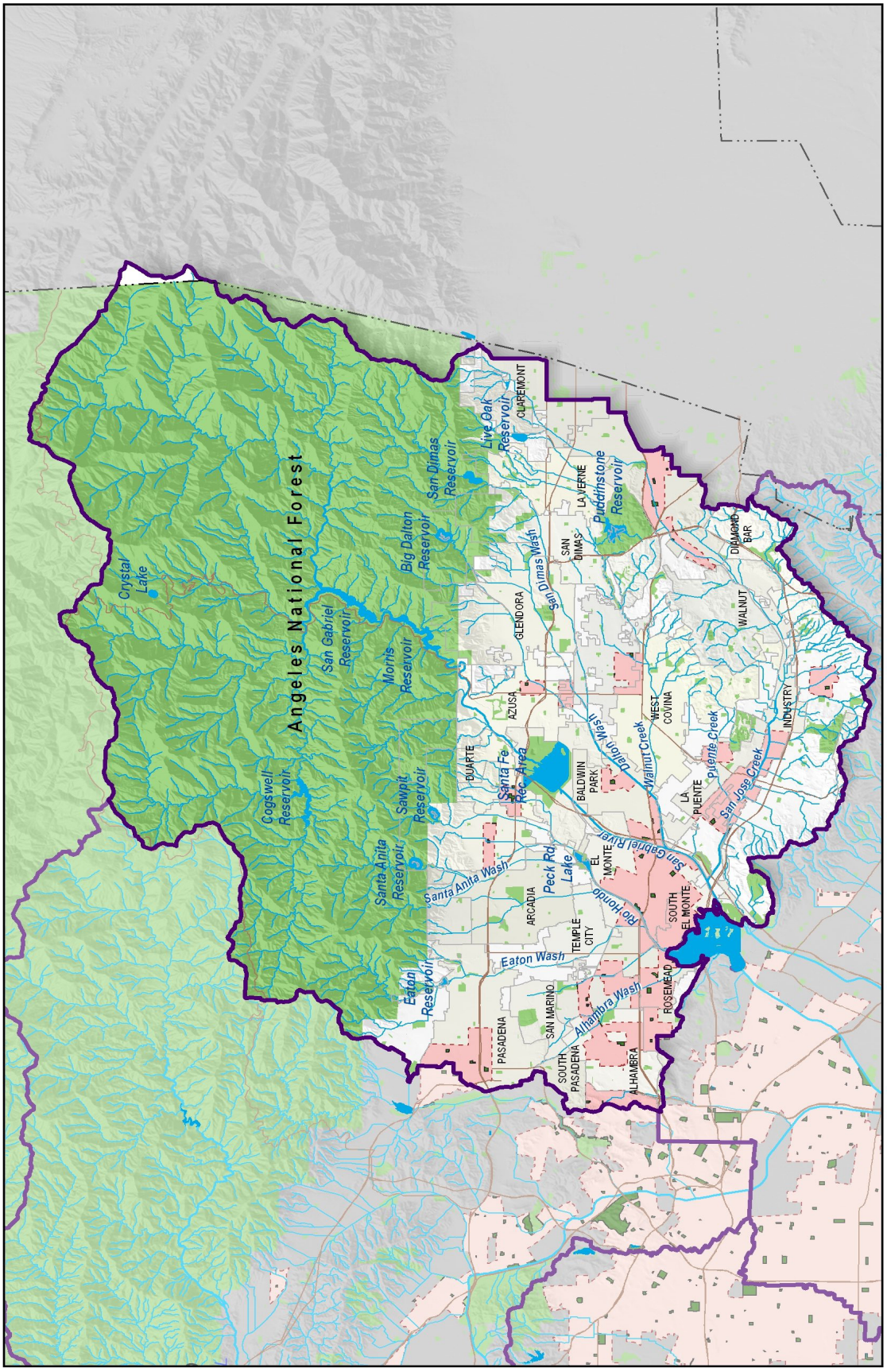
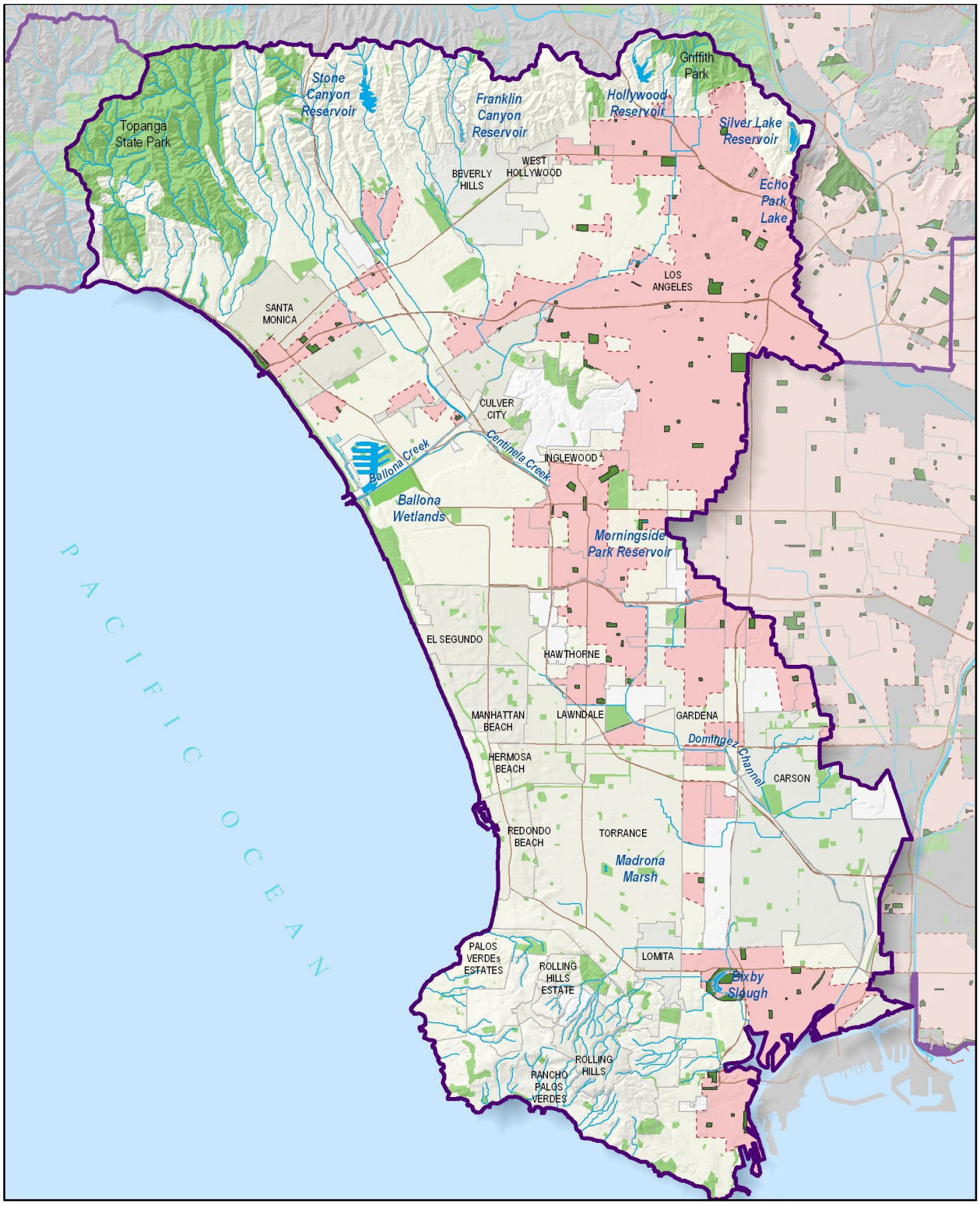
ANAHEIM
LA HABRA HEIGHTS
LA HABRA
LA MIRADA
BUENA PARK
WHITTIER
CYPRESS
CERRITOS
LOS ALAMITOS
SANTA FE SPRINGS
ARTESIA
SEAL BEACH
MONTEBELLO
PICO RIVERA
MONTEREY PARK
COMMERCE
DOWNEY
BELLFLOWER
LAKEWOOD
LONG BEACH
SIGNAL HILL
VERNON
HUNTINGTON PARK
SOUTH GATE
LYNWOOD
COMPTON


Angeles National Forest
Big Tujunga Reservoir
Devils Gate Reservoir
Pacoima Reservoir
Hansen Reservoir
Van Norman Reservoir
Sepulveda Reservoir
Encino Reservoir
Monteria Lake
Chatsworth Reservoir
Girard Reservoir
Calabasas Lake
Griffith Park
LA CANADA FLINTRIDGE
GLENDALE
BURBANK
SAN FERNANDO
LOS ANGELES
Big Tujunga Creek
La Tuna Canyon
Tujunga Wash
Los Angeles River
Bull Creek
Aliso Canyon Wash
Browns Canyon Wash
Dayton Creek
Devil Canyon
Bull Canyon
Bee Canyon
Mormon Canyon
Arroyo Seco
Verdugo Canyon
Shelter Canyon
Arroyo Calabasas
Cabrillo Creek
Parks & Disadvantaged Communities
Upper Los Angeles River Watersheds
Integrated Regional Water Management Plan
Map 2-10 (B)
Disadvantaged Communities
Parks
0 1.5 3 6
Miles
Sources: GreenVision, UEI, SCAG, CaSIL


Angeles National Forest
Crystal Lake
Cogswell Reservoir
San Gabriel Reservoir
Morris Reservoir
Sawpit Reservoir
Santa Anita Reservoir
Eaton Reservoir
Big Dalton Reservoir
San Dimas Reservoir
Live Oak Reservoir
Puddingstone Reservoir
Santa Fe Rec Area
Peck Rd Lake
Eaton Wash
Santa Anita Wash
San Dimas Wash
Walnut Creek
Puente Creek
San Jose Creek
San Gabriel River
Rio Hondo
Alhambra Wash
CLAREMONT
LA VERNE
SAN DIMAS
GLENDORA
AZUSA
DUARTE
BALDWIN PARK
WEST COVINA
DIAMOND BAR
WALNUT
INDUSTRY
LA PUENTE
EL MONTE
SOUTH EL MONTE
ARCADIA
TEMPLE CITY
ROSEMEAD
SAN MARINO
PASADENA
SOUTH PASADENA
ALHAMBRA
Parks & Disadvantaged Communities
Upper San Gabriel River & Rio Hondo Watersheds
Integrated Regional Water Management Plan
Map 2-10 (C)
Parks in disadvantaged communities
Disadvantaged Communities
Parks
0 1.25 2.5 5
Miles
Sources: GreenVision, UEI, SCAG, CaSIL



Parks & Disadvantaged Communities

South Bay Watersheds

Integrated Regional Water Management Plan

Map 2-10 (D)